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The STDP Theory of Financial Crises

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Thesis submitted in partial fulfilment of the requirements for the MPhil in Management.

Date: 28 October 2020

I certify that the work undertaken in this MPhil thesis is my own.

John Diamondopoulos **Date:**

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ABSTRACT

Crises are difficult to predict with the most recent and notable example being the failure of the economic profession to see the 2007-2008 Credit Crunch. Why? The quantitative approach to financial crises depends on one key assumption – the comparability of financial crises. Thus, we should ask: how comparable are crises? An important consideration is the context – social, political and institutional. Next, if financial crises are comparable to a certain extent, then we should be able to make predictions. This naturally leads one to ask: how predictable are crises? Not only did this approach fail to predict crises, but an understanding and explanation of crises was also lacking. In short, a comprehensive theory of financial crises was needed to account for context and thus improve our understanding and explanation of financial crises.

Thus, the failure of the quantitative approach due to the relative non-comparability of crises, led to a search for an alternative approach. Two possibilities were psychological and/or sociological explanations. Additionally, the assumptions of rational agents, cognitive biases (behavioural finance) and the Efficient Market Hypothesis (EMH) need to be critically reviewed.

To this end, the methodological approach undertaken was to look at the world through the 'eyes' of market actors trading in the market. This **unorthodox approach** is underpinned by the **abductive research strategy**. A quasi-experimental study was conducted with postgraduate students engaged in a two-month virtual trading exercise. Three different cohorts were studied during the years 2010 to 2012. The data was mainly interpreted using content and thematic analysis methods. The goal was to find out how prior financial discourse (education) shaped their views and subsequent trading strategies. In addition, the relative importance of psychology and sociology in trading decisions was examined in detail. Ultimately, this would lead to an 'ideal' type market actor or actors for a theory of financial crises. The result of this study supports a 'multiple equilibria' and 'heterogeneous agents' view of the market that is counter to the prevailing financial discourse in finance of the EMH.

To provide structure and to build the theory of financial crises, a complimentary methodology that allowed for the widest latitude, or license if you will, was needed. The **retroductive research strategy** combined with a modified version of the Beach and Pederson (2013) Y-centric theory building process-tracing method was utilized. The result was the development of **The STDP Theory of Financial Crises.** The social, political and institutional context, which is left out in quantitative approaches, was now at the core of this theory. This is a process-oriented theory with a focus on understanding and explaining crises. It is also multi-disciplinary in scope. To this end, crises proceed through four steps: Social, Trigger, Disruption and Psychological. Three case studies on financial crises were conducted to test the theory and to gain further insights.

Key words: Financial Crisis, Crash, Financial Contagion, Bubble, Investor Rationality, Speculation, Policy Making, Policy, Crisis Management, Economic Methodology, Heterodox Economics, Economic Sociology
JEL classifications: B40, B50, E32, E52, D84, G01, G02, G17, G18, H12, Z13

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Chapter 1: Introduction

Understanding, explaining and predicting crises is as still as elusive as ever. This is especially so after the failure of the economics profession to see the 2007-2008 Credit Crunch, a major financial crisis, coming. Why?

Evanoff et al (2012: 3-4) states that a debate has been triggered due to the 2007-2009 financial crisis. At the heart of this debate is what we know about asset price bubbles and how they are managed. On a more basic level the debate is between the efficient markets hypothesis in which major price changes require major changes in terms of information about fundamentals and the *'irrational exuberance explanation'* which implies that asset prices change as a result of something other than the fundamentals. There is little agreement on the causes of asset bubbles, how they grow, what triggers burst bubbles, and predicting the extent of damage to an economy. In addition, what central bank policy measures mitigate the damage caused by financial crises?

Further insight on this debate is provided by Sornette (2003: 3-4) who criticises most approaches since the **time frame of analysis is short-term** and he argues that it should be much longer – months or years. He rests his argument on the time it takes for **market cooperativity to build-up**, which results in increasing interactions among investors. The result is the creation of an asset price bubble. Crashes are seen as triggered by exogenous, or external, shocks but the underlying causes are endogenous, or of internal origin. *'As a consequence, the origin of crashes is much more subtle than often thought, as it is constructed progressively by the market as a whole, as a self-organizing process. In this sense, the true cause of a crash could be termed a systemic instability.'*

An important point brought out by Sornette (2003) in the previous paragraph is that crises are a *'self-organizing process'* and *'constructed progressively by the market.'* Thus, the **context – social, political and institutional** – should play a more prominent role in helping us to understand and explain financial crises. Many current studies on crisis research focus on the **predictability of financial crises** and this is at the **expense of understanding and explaining** financial crises. Thus, it is not surprising that there is a lack of clarity regarding the underlying assumptions and controversy

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around the current debate on financial crises. This is the **heart of the problem** – the **way in which we study crises**. Thus, we first need to look at the limitations of current approaches in financial crises research. Predictability studies on financial crises utilize the large-N approach. However, before continuing further, we will first provide an overview of crises explanation frameworks.

Introduction and Overview of Crises Explanation Frameworks

Many attempts to explain and predict financial crisis have been made in the literature. Warneryd (2001:35) provides a rough categorization as follows:

1. Examination of general economic trends, business cycles, etc.
2. Search for long-term patterns in stock-price data.
3. Search for short-term patterns in stock-price data.
4. Assumptions about psychological changes, having to do either with learning (feedback) or with the diffusion and use of information.
5. Mass phenomena and social influences such as herd behaviour.

The first three reasons focus on indicators preceding turning points to predict and/or point out warning signs before a crash. These explanations focus on the emergence of new information and are based on efficient market hypothesis and rational expectations theory assumptions. However, as Warneryd (2001:31) notes when research takes behavioural data into account, theories become less abstract and more descriptive. Thus, the theories become less able to explain and predict bubbles in an encompassing manner. Instead of a general theory, we start to view each bubble/crash as a specific case.

In short, we can reduce crisis explanation frameworks down to three categories from the five categories mentioned by Warneryd (2001:35):

1. Rational Expectations/Efficient Market Hypothesis (RE/EMH) explanations based on economic trends, business cycles and stock-price data (long and short term).
2. Psychological explanations: correspond to the fourth category above.
3. Sociological explanations: correspond to the fifth category above.

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Finally, crises explanations can vary from reductionist attempts that try to cover everything in one general theory to non-reductionist specific case forms that take the view that each crisis is unique. RE/EMH explanations take the reductionist general theory approach, whereas the Psychological/Sociological explanations tend towards the non-reductionist/specific case approach.

The reductionist approach leads us to ask the question of how compatible and predictable crises are by using many cases. In Diamondopoulos (2012b), I provide a detailed look at the quantitative (large-N) approach to financial crises.

First, the assumptions of comparability of financial crises are critically examined. The key question here is **how comparable are crises?** An important consideration here is the context – social, institutional and political. Second, if financial crises are comparable to a certain extent, then we should be able to make predictions. Thus, the second key question is **how predictable are crises?**

In short, the current financial discourse centered on the Efficient Market Hypothesis (EMH) has failed to predict financial crises let alone to provide an adequate explanation of financial crises. Equally, ideas relying on the temporary 'irrationality' of investors from the behavioral finance camp do not look convincing. In one moment, investors are 'rational,' whereas in the next moment they are 'irrational' such as when crises are triggered.

The main conclusion and contribution of my research, Diamondopoulos (2012b), is **that predictability of financial crises**, the focus of much of the academic literature, is **fruitless due to compatibility concerns arising from context** (social, political and institutional) and that psychological explanations are not adequate.

The finance/economic literature, as exemplified by Reinhart and Rogoff (2009) in their book – This Time is Different: Eight Centuries of Financial Folly, emphasized the similarities of financial crises. Similarities are accentuated in large-N studies, whereas differences are brought out in small-N studies. This research study takes the small-N approach.

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In short, large-N studies remove crises from their historical context – **social, political and institutional**. This is necessary in order to run the quantitative tests. The crises need to be de-contextualized to simplify the mathematics in the hope of obtaining predictability. The comparability of crises is questionable once they have been de-contextualized. This allows for more crises cases to be utilized in running the predictability models. However, the cases are superficially lumped together and important differences between crises are ignored.

Additionally, in Diamondopoulos (2012b), I found that **crisis prediction models are very limited** due to the large number of variables they need to deal with plus the fact that variables change in importance depending on the crisis. Most of the better results were a **result of contagion**, specifically studies dealing with the 1997 Asian crisis. For the convenience of the reader, the article link to my study, Diamondopoulos (2012b), is provided here: http://dx.doi.org/10.2139/ssrn.2241524

This has implications for a theory of crises and in how governments manage financial crises. By taking the context out, large-N studies have possibly missed important information towards the development of a theory of crises. Thus, qualitative studies that leave the context in might be the answer, either alone or with quantitative studies. Finally, policymakers need to be very cautious when using crisis prediction models due to questionable comparability assumptions.

The Main Research Problem and the Limitations of Current Approaches in the Study of Financial Crises

The failure of the large-N approach common in the study of crises as discussed in the previous section, leads us to explore crises from a different perspective. Thus, new ways of looking at crises are required. In this study, we will focus on the process of how a crisis unfolds to develop a theory of crises and then to test this process theory in three financial crisis case studies.

As noted, one of the main criticisms is that current studies take crises out of context – culturally, politically and historically – when using large-N samples to generalize in the social sciences. In addition, **crises are spaced relatively far apart time-wise** and the **context can be very different** from one crisis to the next. Thus, how statistically

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valid are large N studies? Finally, the crisis literature relies heavily on explanations using economic/financial models. All these models come with the **caveat to hold other factors constant**, in other words, other factors are not relevant.

Dupree (2001:12-13) discusses **two assumptions embedded in models**. One is determinism and the other is a closed system. **Determinism** assumes that the system being modelled is machinelike (the interaction of causes is in a fully deterministic way). The other assumption is that the environment is a **closed system**. According to Dupree, models only represent some aspect of reality and in most cases not very well represented. This leads to misguided assumptions that prediction in very specific environments will allow one to predict in other environments. Thus, he is not surprised to see most economic models fail miserably since they don't correspond to reality in most cases.

As discussed, the crisis models rely on two assumptions – determinism and closed systems. In addition, **complexity** is not captured in these models. The focus is squarely on the dependent/independent variables, **not on the process**. Explanation and the underlying logic of the model to replicate reality are usually downplayed since the focus of the model is prediction using probabilistic statements.

To counter these limitations, a **multi-disciplinary approach** that incorporates aspects of finance, psychology, sociology and politics needs to be undertaken.

It is the view here that **economics and finance are social sciences** rather than natural sciences as some believe. This is an important distinction since it has implications for what constitutes a suitable research strategy and design. As Benton and Craib (2001:14) state, in the natural sciences (specifically physics and chemistry), experiments can be designed to isolate one factor in a closed system. Since the **social sciences are open systems with lots of variables**, it is much more difficult to isolate one factor or for that matter predict outcomes.

This perspective leads one to focus on understanding and explaining and not on predicting financial crises. In this study, we will **focus on the process of how a crisis unfolds** to develop a process-oriented theory of financial crises. We then compare crises based on the process of how they unfold. Next, we discuss our approach towards

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achieving this aim by providing an overview of the key elements needed plus a discussion on the main research question: **Why do financial crises happen?**

The Development of a Process Theory of Financial Crises

Our focus is on the process of financial crises. In methodological terms, we are interested in **'causal mechanisms.'** As Bennet and George (1997:1) put it, *'... the causal processes and intervening variables through which causal or explanatory variables produce causal effects...'* Framing the study as a **search for causal mechanism(s)** allows us to unpack how a financial crisis unfolds.

Discussing casual effects and causal mechanisms for making causal inference, Bennet and George (1997:1) state due to the limitations of causal inference more emphasis is now being placed on causal mechanisms. This supports our earlier discussion regarding large-N approaches to studying crises. In this study, we will utilize **mechanisms at both the macro and micro level**. The link between them will be a **disruption mechanism**.

Thus, developing a financial crisis theory based on how crises unfold has an underlying aim of understanding and explanation requires five key elements as follows:

1. **Research Question:** focus on understanding and explanation. The main question: ***Why do financial crises happen?***
2. **Research Design & Methodology:** needs to emphasize and prioritize understanding and explanation over prediction and ultimately on creating a process theory of financial crises.
3. **Micro-Level Mechanism:** the current model of agency in finance based on rational expectations and the Efficient Market Hypothesis (EMH) is inadequate. The attempt to plug the 'holes' in this model with behavioural finance has been haphazard at best. A new micro-level mechanism for finance is crucial and this model needs to incorporate understanding from the point of view of the market actor.

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4. **Disruption Mechanism:** the theory needs to incorporate an appropriate channel to link the macro with the micro-level mechanisms.

5. **Macro-Level Mechanism:** the focus on explanation requires a process model that looks at how a crisis unfolds over time. Thus, a comparison of crisis takes on a new meaning - comparing the process of how crises unfold.

The research design employs the **Abduction and Retroduction research strategies**. A distinguishing feature of these two research strategies (RS) is the focus on theory creation. Both research strategies are cyclical and spiral processes, unlike the more linear Deductive and Inductive research strategies as stated by Blaike (2000).

Blaike (2000:113) states that the Deductive RS focuses on propositions on the relationships between variables/concepts, while the Retroductive RS focuses on establishing the existence of **a structure or mechanism** that produces observed regularity, in other words the process. In addition, the Retroductive RS argues that prediction is impossible in the social sciences because of the open nature of social systems. Thus, we will rely on the Retroductive RS to develop structure and to develop an explanation of how a crisis unfolds.

In a process theory of financial crises, the focus is on the **historical context** and a **temporal element** of how events unfold. How a crisis unfolds needs to include historical context - social, political and institutional aspects Thus the approach taken has to encompass a multi-disciplinary approach, as stated before.

The process theory consists of four steps in which the focus is on the social and political processes during a financial crisis. How crises unfold is encapsulated in the following four steps: **Social, Trigger, Disruption, and Psychological**. First, clustering of trading opportunities and risk frameworks occurs in the financial market. Different trading/investment strategies become institutionalized with their own set of systems, procedures and *'ways of thinking'* or discourse. This is the **social (and institutional)** aspect of the financial markets. Second, when financial crises occur, a endogenous or exogenous **trigger** occurs with the crisis localized within one or a few trading/investment strategies. Third, as the crisis unfolds, **disruption** occurs of the

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'discourse' (or the way the market is viewed) of an increasing number of market participants utilizing various trading/investment strategies. Fourth, as the market participants utilizing various trading/investment strategies lose confidence, the **psychological and new social (institutional) phase** of a crisis begins.

In short, the Abductive RS will focus on the micro-level mechanism and disruption mechanism whereas the Retroductive RS will focus on the macro-level mechanism and the sequence and fit of all three mechanisms. Next, we will discuss the logic behind the structure of the study.

Structure of the Research Study

The research design has a focus on theory creation. Thus, there is a strong argument to first start with the methodology chapter. This is the logical sequence based on the research strategies – Abduction and Retroduction. However, we decided to structure the study in a traditional approach with part of the literature review chapter having a different purpose.

The **iterative nature of the theory-building methodologies** requires an extensive use of combining evidence with references to scientific literature. This is the essence of the Abductive research process, to convert lay accounts of the world into a scientific account to build up a representative or 'ideal-type' agent. To improve overall readability and to accommodate this structure, **the literature related to the abductive research study in presented in Chapter 2: Part B**. This is done for the sake of overall clarity and coherence of the thesis, otherwise a large amount of literature would have distracted and made for difficult reading right after the methodology chapter.

In addition, both the Abductive and Retroductive research strategies are a bit opaque or not as straight forward as other research strategies in terms of the steps needed to carry out a study. Perhaps this is by design since the key features of these methods are flexibility or great degree of latitude allowed and most importantly the **'license' to be creative** for the purpose of creating a theory.

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It should be noted that the goal here is not to provide definitive evidence, but to provide **sufficient evidence**, that leads to a 'way of viewing' events thus allowing for the creation of a theory. Thus, a more creative and flexible approach is needed.

Implementation of the Abductive and Retroductive RS introduced additional complexity in structuring the study. Thus, it was important to bring **more clarity by reducing the complexity** of the study. To achieve clarity and to provide the reader with the right lens to view this study, we structured the chapter sequence as follows:

Chapter 1: Introduction

This section **sets the stage** for the research study. The main problem is the way that we study crises and that the creation of a crisis theory requires a different approach. This chapter makes the case for incorporating historical perspective – social, psychological and institutional in the way we study crises. The goal of a process theory of financial crises is clearly stated and would require a different approach.

Chapter 2: Literature Review

Assumptions Revisited and Insights towards a Process-oriented Theory of Financial Crises.

In Part A, we provide an overview of business cycle theories related to financial crises. The key result here is assumptions and issues that are critical for the future development of a process theory of financial crises. In Part B, we focus on the literature related to the abductive process. This literature is then later used as part of the development of the micro-mechanism and disruption mechanism in a financial crisis theory. In short, this is the technical (scientific) account that was produced from the 'lay' accounts in the abductive research study.

Chapter 3: Research Design & Methodology

Theory Creation: STDP Theory – the process of financial crises

An important chapter to show the reader a 'way of thinking' that allows us to create a theory. It was important here to examine the process of theory creation thus this chapter is theoretical in nature with practical references to application noted or in succeeding chapters. It was important first to provide a strong outline and justification of the unorthodox approach in a clear way to reduce complexity.

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Chapter 4: 'Insights' towards a Crisis Theory

This part is split into two sections. First, we provide and introduction/overview to the role of the literature review/abduction in Part I. This is basically the outcome of an extensive quasi-experimental study conducted using the abductive research method. Second, we provide a condensed version of key points from this study in Part II. Finally, in Part III, we discuss modifications and 'fit' between mechanisms.

Chapter 5: The STDP Theory of Financial Crises

The Retroductive RS is then used to develop the 4-step Macro Mechanism and Disruption Mechanism and Micro Mechanism of the STDP Financial Crisis Theory. The theory is focused on the processes behind financial crises with each step of the process justified in detail. In addition, a crisis magnitude framework is proposed.

Chapter 6: Case Studies

The STDP Theory of Financial crisis is tested using process tracing methods. Case studies highlight the applicability and flexibility of SDTP Theory to three financial crises. These cases were specifically chosen to cover the two major crisis periods of the modern finance era and to showcase how the theory explains the quick resolution of a third crisis due to geopolitical factors.

Chapter 7: Conclusions

In this chapter, we conclude with remarks on the contributions and limitations of the SDTP Theory of Financial Crises. There are six main contributions from the study and each is highlighted along with limitations where possible. The contributions were:

Broad and Comprehensive Crisis Explanation Framework
Incorporation of Historical Context – Social, Political and Institutional
Comparability of Financial Crises – through the process of how crises unfold
Improved Understanding and Explanation of Financial Crises
Realistic Micro-Mechanism for Financial Markets
Refinement of a Theory-Building Methodology

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Chapter 2: Literature Review

Title: Assumptions Revisited and Insights towards a Process-oriented Theory of Financial Crises

This study consists of two sections. In Part A, we examine relevant literature on business cycle and non-cycle crisis frameworks, models and theories to provide a concise overview of key themes/assumptions. In Part B, the relevant literature about financial market behaviour is presented. This literature is part of the process that helped to provide insights or 'clues' for the process-oriented theory of financial crises.

Key Words: Crisis Frameworks, EMH, Economic Assumptions

Part A: Business Cycle/Non-Cycle Crisis Explanation Frameworks

A categorical representation of crisis explanation frameworks based on the business cycle in the literature can be found in Wolfson (2015), Hedrickson (2013), D'Apice and Ferri (2010), Toporowski (2005) and Todd (2008). All provide an overview of the various business cycle frameworks. None of these authors provide a comprehensive overview of all the theorists but instead focus on a selected few.

For example, Wolfson (2015: 5-6) splits business cycle crisis explanation frameworks into two groups. **Business cycle theorists**, early and contemporary, are couched firmly within the business cycle, **non-cyclical theorists** relying less on the business cycle consist of Monetarism, Asymmetric Information and Speculation.

On the other hand, D'Apice and Ferri (2010) use a micro or macro-level perspective to split crisis explanation frameworks. **Macro explanations** focus mostly on currency crisis. First-generation models, stress between economic policies and fixed exchange rated were developed by Krugman (1979); second-generation models by Obstfeld (1996) focused on speculators and expectations, while third generation models by Kaminsky and Reinhart (1999) looked at 'twin crises' where a banking crisis resulted in a currency crisis. Typical of **micro explanations** is a focus on the banks and the banking system. Key assumptions in these models are **asymmetric information** and

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monetary policy transmission, represented by Mishkin (1999), Bernanke (1983) and Bernanke and Gertler (1995).

Many of these macro and micro explanations led to a search for the variables in large-N studies focusing on the predictability of financial crises. As discussed in Chapter 1: Introduction, I argued in my study, Diamondopoulos (2012b), that predictability is fruitless due to compatibility concerns arising from context (social, political and institutional) and that psychological explanations are not adequate.

Most, if not all, of these business cycle theories would correspond to the Rational Expectations/Efficient Market Hypothesis (RE/EMH) Type I in the Warneryd (2001:35) framework as discussed on page 11. Only one or two business cycle theories would be classified as Type II (Psychological) and III (Sociological) explanations either partially or in full.

Next a short overview is provided to add some historical context to some of these theories. Of specific interest to this study are the theories of **John Maynard Keynes** (business cycle contemporary theorist) and **Charles Kindleberger** (non-cyclical contemporary theorist).

The early theories identify important factors in business cycles and lay the foundation for modern macroeconomic theories. According to Todd (2008: 5, 60, 67-74) the early theories are simple and focus on one factor behind business cycles, examples include The Sunspot Theory, Mercantilism (early monetary theories), The Classical Model and The Debt-Deflation Theory.

The Sunspot Theory contributed to the idea of **'self-fulfilling behaviour'** in economics today; agents anticipate future changes and incorporate them into current behaviour. This theory was developed by W.S. Jevons in 1884. His main view was that low sunspot activity led to diminished plant growth and thus agricultural output. His calculations were slightly off and early, thus to defend his theory Jevons explained this was because farmers anticipated the sunspot cycle by about six months.
Early monetary theories such as Mercantilism saw the key to stability in a business cycle was to maintain stable gold reserves. Under this view, money supply was very

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narrow – gold or currency and coins backed by gold. Other financial assets played no role. While these assumptions are very simplistic, the idea of **money supply in determining economic volatility** is integral to Monetarist business cycle theorists today. Additional contributions include the importance of **financial systems, financial intermediation** and ideas on how changes in **interest rates affect financial intermediation and investment**.

The Classical Model is based on Adam Smith (1776) and later refined by David Ricardo, Jean-Baptiste Say and John Stuart Mill. There are three key assumptions and implications for business cycle theory. First, the key assumptions are: **perfect competition in all markets, agents have homogeneous preferences and act similarly, agents are money neutral** (only real values matter) and not fooled by nominal price changes in their decision-making. Under this model, macroeconomic behaviour is simply the sum of individual behaviour and monetary policy only impacts inflation not real economic output. In short, Todd (2008: 75) notes that critics of the model saw it as just a study of microeconomics but with larger quantities. The Classical model suffered from faulty logic known as 'fallacy of composition,' which means that what is true for the individual does not translate always to truth about the group. In this model, the role of government is seen as negative here except for selected areas such as education, infrastructure etc. In short, government, regulations and taxes are characterized by the **'laissez-faire'** or **'hands off'** approach. Finally, the assumption of **perfect information** means that problems and complexities associated with financial intermediation ignore asymmetric and imperfect information explanations.

The assumptions behind the Classical Model are embedded in the Efficient Market Hypothesis (EMH) developed by Fama (1970) and have had an enormous impact on market actors in the financial markets. Toporowski (2005: 80) mentions Emory (1896) an American lawyer who engaged in financial economics as having developed a theory that was at a precursor to the Efficient Market Hypothesis (EMH). He had used this to defend against regulation of the futures markets. Emory also had an influence on the early thoughts of Keynes regarding finance.

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A relaxation of the 'perfect information' assumption can be seen in **asymmetric** explanations for example. Hsu (2013: 21-24) finds the asymmetric approach by Bernanke (1983) as more convincing than the monetarist view of Friedman and Schwartz (1963) regarding the Great Depression. Hendrickson (2013: 36-40) provides an overview of the Asymmetric Information perspective of Frederic S. Mishkin. Bernanke and Mishkin are two of the leading authors from this school of thought. In short, they relax rationality assumptions in their micro-focused explanation of financial crises.

The Debt-Deflation Theory originated from Irving Fisher (1933) who lost most of his fortune during the stock market collapse of the Great Depression. Todd (2008: 72-74) states that Fisher placed the blame squarely on financial systems. In short, lending booms occur then an external shock (decrease in money supply or drop in profits) leads to interest rate rises leading to panic selling and financial deterioration of firms and households. Lenders reduce supply of loans and financial intermediation breaks down. There are two key insights from this theory. First, market participants overreact to good or bad news. This raises the question of **expectations being somewhat irrational**. Second, Fisher was the first to point out the **dangers of deflation** – either in aggregate price level drops or asset deflation. Finally, deflation can lead to disintermediation which results in bank withdrawals due to interest rates dropping to zero. **This reduces the ability of central banks to use monetary policy**. Todd notes that the Debt-Deflation Theory was used to explain crises such as the Japanese and East Asian Crisis. In addition, it has many common features with Keynes General Theory (1936).

Toporowski (2005: 77-78) notes that as an idea, deflation lost interest in the economics profession after WWII. Thus, the Debt-Deflation Theory fell out of favour and in any event Fisher's analysis had been overtaken by the more sophisticated explanation of the depression offered by Keynes. The Debt-Deflation Theory was later discovered by Minsky and then by Friedman in his monetarist explanation of the Great Depression.

Business cycle models and macroeconomic theories post-Depression consist of five major groups according to Todd (2008: 76). The five groups were: Keynes' General

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Theory, Keynesian Theory with IS-LM model, post-Keynesian Financial Instability model, the Monetarist model and Neoclassical models. An important struggle during this period focused on the **role of financial systems**. In Keynes' General Theory financial systems were in **disequilibrium** but post Keynesians under the IS-LM model assumed financial systems in **equilibrium**. Thus, financial institutions were ignored in Monetarist models and Neoclassical models. In addition, Hyman Minsky's Financial Instability Hypothesis was ignored. In short, money supply or the discretionary use of monetary and fiscal policy were the causes of business cycles respectively. Under the Real Business Cycle (RBC) model, financial systems were always efficient and markets perfectly competitive.

Two key insights of Keynes' General Theory (1936) that are particularly relevant to this research study are the ideas of a **'highly subjective' or uncertain future** and the **beauty pageant analogy** regarding the decision of investors to choose the best stocks.

Keynes tried to capture the behaviour of agents through the term 'animal spirits.' Todd (2008: 78) notes that for Keynes **this did not necessarily mean that agents should be viewed as irrational**. In short agents make decisions in an uncertain future subject to changes of market perceptions (self-fulling idea from the Sunspot Theory). Thus, *'...making economic performance very sensitive to changes not just in what people think, but in changes in what other people are thinking.'* For Keynes, *uncertainty and business confidence* were of greater importance than the interest rate in investment decisions.

Toporowski (2005: 92) notes that speculators according to Keynes cannot know the future value of an investment. Thus, **speculators can only have different levels of confidence** and confidence levels vary from optimistic to pessimistic based primarily on recent evidence. This leads to overconfidence during booms and pessimism during recessions.

The start of recessions under Keynes General Theory (1936) is similar to the Debt-Deflation Theory. They begin during an economic expansion and are based on animal spirits and speculative behaviour. New information arises that impacts investor confidence and leads to a recession or crisis. A fall in confidence leads to uncertainty

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and increases instability. Todd (2008: 79 - 81) notes that unlike the Debt-Deflation theory the emphasis is not on debt contracts. Thus, the **financial system** plays a key role in his theory since it transfers instability. Finally of note, Keynes was sceptical of monetary policy being effective due to timing issues, thus he favoured government spending (fiscal policy).

According to Todd (2008: 82 - 83) since Keynes thought economic processes were very complex, he resisted using equations and empirical data. To make his ideas clearer and more acceptable to economists and policy makers, his difficult model of disequilibrium needed to be transformed into a simpler market equilibrium model. Other Keynesian economists, most notably John Hicks (1937) with his IS-LM model stepped in with an equilibrium model. The differences between the two models resulted in a **reduced role for financial systems in the business cycles**. The result was that Keynesians had a bigger belief that monetary policy could stabilize the economy. Mainly based on an assumption that speculation was not due to investor investment decisions but more about future uncertainty of macroeconomic conditions. Interest in monetary policy was further driven by Arthur Phillips (1958) with his work on the Phillips curve (the trade-off between inflation and unemployment).

Wolfson (2015: 16) notes that the financial system played a key role in the Financial Instability Theory by Hyman Minsky in 1977. In fact, a large part of his theory is based on a reinterpretation of Keynes and this has resulted in a re-emphasis of three topics: **uncertainty, business cycle and finance**. The interplay of these three topics form the foundation of Minsky's theory. In short, investments decisions are the starting point in the process, but these are highly uncertain. Instead of actors changing views in an unsystematic fashion, Minsky posits that endogenous systematic changes in the normal business cycle are the cause. *'Each stage, whether it be boom, crisis, debt-deflation, stagnation, or expansion, is transitory ...Whenever something approaching stability is achieved, destabilization processes are set off.'*

One of the most popular accounts of financial crises in the psychological camp **(non-cyclical framework)** is by Kindleberger (1996), titled Manias Panics and Crashes. The methodology taken by Kindleberger is from an economic historical approach. The **main assumptions of rationality** found in economics are not the same taken by

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Kindleberger. In fact, Kindleberger (1996: xiii) states, *'...a good number of economic theorists have dismissed this sort of work as being outside the bounds of economics: it conveys suggestions of irrationality, whereas for them economics rests solidly on the axiom that man is rational, knows his mind, and maximizes, or as optimizes, his utility or well-being.'*

In short, Kindleberger (1996: xvi) according to Bernstein**, relaxes the 'rationality' assumption**, provides a model (but not in the mathematical sense) and stresses the ambiguous nature of decision-making during times of crises. To emphasize this point, Kindleberger (2006:1) states his main research question, *'Are markets so rational that manias – irrational by definition – cannot occur?'*

A crisis is defined by Kindleberger (1996: 1) as only those downturns that *'...are major both in size and in effect and, as a rule, international in scope.'* He distinguishes between the normal contractions of the business cycle and large contractions occurring after a peak in the business cycle. Thus, the definition of crises that Kindleberger (1996) puts forth relies heavily on the **magnitude of that crisis** to the economy.

Kindleberger (2006: 2) states that excesses are not present in all upswings. A particular event alters the economic outlook and due to new business opportunities actors overinvest in an **irrational manner** thus the start of a mania. This leads to **'distress'** at some point and the whole process reverses resulting in panic.

An important point made by Kindleberger and Aliber (2005) is that **'irrationality'** begins in the **valuation of a new opportunity** and a crash occurs when market participants realize their mistaken valuations. What is important here is the implied cause of the over valuations in the first place. The opportunity is new which means that establishing a value is difficult since market participants have little historical data to rely upon.

Although not stated explicitly, the valuation of new opportunities could rely on the **social construction of prices**. And since the opportunity is new, the social construction of its value is ambiguous in the beginning. It takes time for the market to come to an acceptable socially constructed value and when the market realizes the overvaluation mistake, a crash occurs.

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In summary, **how we view crises depends on our viewpoint**. For example, we can get a different view on the causes depending a belief on micro or macro causes. In addition, our assumptions on rational or irrational actors plus whether the future is uncertain or predictable play a key role. Is the origin of the shock – endogenous or exogenous and what about our assumptions regarding information, perfect or asymmetric. Finally, what is the relevance of financial systems and monetary policy and is the economy in equilibrium or disequilibrium.

These assumptions or more specifically the assumptions that form a crisis explanation framework are key to understanding and explaining crisis. For example, the assumption of equilibrium or disequilibrium in models is taken up by Krugman (2011: 311), who notes that it was the ignorance of the economics profession to exclude the Keynesian idea of non-equilibrium and that had implications for the failure of economics regarding the 07-08 financial crisis.

Krugman (2011:311) states, *'First, success in academic economics came from publishing 'hard' papers – meaning papers that used rigorous and perfectly difficult mathematics. This in itself biased publication towards equilibrium business cycle models ...they closed off both publication and promotion to anyone questioning the dominant academic approach.'* The rigorous rational modelling approach dominated economics and students were mostly educated in this view to the exclusion of other approaches. Thus, the importance of taking an open and critical approach.

Next, we try to address some of these issues as part of the development of a theory of financial crises. The following are some of the **key issues** that need consideration in the development of a process-oriented theory of financial crises are:

Rationality Assumptions of Agents
Equilibrium or Disequilibrium in Markets
Importance of Sociological and Psychological Factors
Macro or Micro Explanation (Agent-Structure Issue)
Incorporate Historical Context – Social, Political and Institutional
Avoid Reductionism: tendency to place cause on banks for example

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Part B: Relevant Literature on Financial Market Behaviour

The literature on financial market behaviour three areas that are important to the development of a process theory of financial crises. The relevant areas are: rational and agent assumptions, the importance of social and psychological factors and finally the inclusion of political factors. In addition, we are addressing some of the concerns and issues raised from the literature review in Part A.

Rationality Assumptions, EMH and Equilibrium/Disequilibrium in Markets

A brief overview of the Efficient Market Hypothesis (EMH) will be provided, then we will discuss assumptions of rationality and non-rationality plus views on equilibrium in financial markets. The EMH was put forth by Fama in 1970. This financial discourse is based on rational expectations and has three forms – weak, semi-strong and strong.

The strong version of the EMH states that all information including private information is incorporated into prices. If this were true, Fama is implying that it is not possible to make money here. However, he has stated that this is probably an unrealistic assumption. A useful analogy here is the idea of perfectly competitive markets in economics which don't exist in reality.

The semi-strong version of the EMH states that all past and publicly available information is already reflected in prices. This includes all publicly available information such as annual reports. Thus, it is difficult to get fundamental analysis (FA) right. If the market is efficient, then fundamental analysis would add little value.

Finally, the weak version of the EMH states that all past information is incorporated into prices. This implies that traders using technical analysis (TA) to predict future prices from past patterns will not succeed.

Thus, a belief in either the strong, semi-strong, weak EMH forms or a belief in the non-existence of the EMH has major implications on the choice of a trading strategy that is eventually chosen by market actors in an attempt to beat the market.

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Before going further, it is important to discuss the concept of discourse. In short, economic discourse is the **institutionalization of 'neoclassical' economics** as 'mainstream' economics – the standard. This means that all other theories of economics have become subordinate to the 'neoclassical' approach. Students are indoctrinated into this 'belief system.' In the closely related field of finance, this 'belief system' is expressed in the discourse emanating from the Efficient Market Hypothesis/Rational Expectations paradigm (EMH/RE).

Mirowski (1989) chronicles how 'neoclassical' economics emanated from physics in the 1870s. Economics wanted to emulate physics since it was considered the queen of all science. Fullbrook (2004) criticises economists for deluding themselves into thinking that mathematics makes an exact science.

Jorgensen and Phillips (2002: 1) state that the term discourse is used indiscriminately, but it is based on the underlying idea that, '*...language is structured according to different patterns that people's utterances follow when they take part in different domains of social life, familiar examples being "medical discourse" and "political discourse". "Discourse analysis" is the analysis of those patterns.'*

In short, discourse here means a **'way of thinking'** engrained through education and subsequently through the practice of finance. University departments steeped in this discourse not only maintain this through education and training but also through the hiring and promoting of staff.

The RE/EMH discourse leads essentially to only two main types of agents (fundamental and technical) plus one agent type (liquidity) that is assumed not to play a significant role due to an equal number of players on both sides of the market. This is the approach taken by much of the finance literature. For example, one finds this framed as **'smart money' versus 'dumb money'** (noise traders). What is assumed in this literature is that the 'smart money' consists of agents using fundamental analysis whereas the 'dumb money' consists of agents using technical analysis.

The implication, of course, is that the 'smart money' is a profitable trading strategy whereas the 'dumb money' is a non-profitable trading strategy. And this viewpoint has heavily impacted the how the academic community in finance defines agency.

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In reality, numerous studies have looked at the profitability of these two strategies with inconclusive results. Most of these studies are very biased and/or contain major/minor flaws. A good overview of this literature can be found in the meta-study by Park and Irwin (2007) that examined over 95 academic studies regarding the profitability of technical analysis. Stuber (2012:30) makes the point that as long as your winners are twice as profitable as your losses then a 40% success ratio is fine. In addition, how your account grows depends on the order of winners and losers.

Furthermore, Schulmeister (2006: 216) provides support for this view that technical trading systems make profits by riding trends. He states that a position that is profitable is held 3 or 4 times longer than a position that is unprofitable. In short, profitable trades also need to be large enough to cover the transaction costs. Thus, the reason that technical analysis rules might be profitable is paradoxically not because technical analysis works or makes any sense, but because of the risk management processes that are used that are encapsulated in the following statements: "cut your losses short, let your profits run" and "the trend is your friend".

In short, the **choice of trading strategies implies a belief or non-belief** in the dominant discourse of finance - EMH. For example, the choice to use technical analysis as the main general trading strategy implies a non-belief in the EMH. Since the weak form of the EMH states that a trading edge cannot be gained from past prices. A third possibility exists for insider trading strategies (both legal and illegal). Legal insider trading strategies are in present in the FX markets, private equity and venture capital for example. Thus, you end up with three main general trading strategies as follows:

1. Fundamental Analysis: implies a belief in the weak EMH
2. Technical Analysis: implies that one does not believe in the EMH
3. Insider Strategies (both legal and illegal): implies a belief in the semi-strong EMH

It should be noted that technical analysis (TA) is too general of a term to be useful since underneath this general term, technical analysis (TA) consists of numerous strategies. Some of these strategies are in fact underlying fundamental strategies whereas others are related to taking advantage of the behavioural biases of traders (behavioural finance). For example, analysing the sentiment of the market, a technical

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analysis strategy, attempts to gain a market edge from the psychological trader biases such as over and under reaction.

In short, we end up with an argument between proponents of the EMH (weak form – fundamental analysis) versus proponents of behavioural finance (certain types of technical analysis strategies).

Behavioural finance explanations relax the rational actor assumption that was at the heart of the RE/EMH explanations. The key assumption is that market participants are not rational (psychological, prospect theory explanations). For example, studies by Tversky & Kahneman (1974, 1981, 1986), Kahneman & Tversky (1979), De Bondt & Thaler (1985, 1987), Miller (1977), Russel & Thaler (1985), Cipriani & Guarino (2003), Barberis & Thaler (2003), Neiderhoffer (1971) and Shiller (1997) provide evidence to support this view.

Shiller (1997) reviews how theories of human behavior/behavioral principles (originating primarily from psychology, sociology and anthropology) have influenced empirical research on the behavior of financial markets with particular implications for the efficient market hypothesis in finance. Of all the theories of human behavior, Shiller lists **prospect theory** (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992) as the most important next to **expected utility theory** in economic research. Additional theories of human behavior (overconfidence, over- and under-reaction and the reepresentative heuristic) from behavioral finance are also important. Fischhoff, Slovic and Lichtenstein (1977) show that overconfidence exists while Ross (1987) provides a psychological explantion as to why overconfidence occurs. However, overconfidence does not necessarily lead to over-reaction or under-raction. Shiller (1979, 1981a,b) and LeRoy and Porter (1981) provide statistical evidence of general market overreaction and this evidence questions the validity of the efficient market hypothesis.

The rise of behavioral finance has resulted in actors classified as **'irrational'** or having **'bounded rationality'**. This is more realistic, but it also makes the analysis messier and possibly more difficult to predict a crisis. In one sense, 'irrational' or 'bounded rational' actors make the analysis messier since any mathematical model will now become more complex. In another sense, if there are patterns of 'irrational'

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or ‘bounded rational’ behaviour, then a prediction model is possible, and it would be more realistic.

The creation of ‘noise traders’ in financial models introduces the so-called ‘dumb’ money to account for the anomalies existing in the market as shown by behavioral finance. In discussing behavioural models in reference to the profitability of technical analysis rules, Park and Irwin (2007) make the point that **behavioural finance** accounts for anomalies in the market primarily through the **creation of the ‘noise trader’** who represents ‘dumb’ money and are prone to psychological biases in his or her decision-making. In other words, behavioural finance can be viewed as a **plug** for the inability of the RE/EMH discourse to explain market anomalies.

Thus, thus less stringent rational agent assumptions allow the RE/EMH discourse to place the blame on ‘noise traders’ or ‘irrational traders’ for prices that move far from fundamental value. Thus, markets can still be said to be efficient since rational traders, also referred to as arbitrageurs or ‘smart money,’ will bring prices back to fundamental value. One of the problems with this view, as will be discussed later, is that sometimes the ‘irrational traders’ keep moving prices away from so-called fundamental value and they roll over arbitrageurs who are in their way. This is called fundamental risk, since arbitrage is not as risk-free as it is commonly portrayed in finance.

Shleifer (2000:33) views noise trading as a source of risk (called fundamental risk) for the arbitrageurs. Two big assumptions are that noise traders have erroneous beliefs and that these erroneous beliefs are most likely due to psychological reasons. The main support for the erroneous beliefs of ‘noise traders’ seems to be based on the idea that they are not trading on fundamentals but that their decisions are based on psychological reasons which are biased. There several problems with this line of reasoning. First, there is the implication that asset prices have a fundamental value. Second, this fundamental value is known by arbitrageurs. Third, the fundamental value is held to be the same by all the arbitrageurs.

However, what is overlooked by Shleifer (2000) is the **role that sociological factors** might play in determining the decisions of ‘noise traders’ and additionally by arbitrageurs. By following technical analysis strategies, ‘noise traders’ are primarily reacting to what other traders are doing. **Thus, this is not psychological but social.**

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Additionally, the essence of technical analysis strategies is to avoid or minimize psychological biases in trading by following rules in systematic trading (mechanical). In fact, fundamental traders and arbitrageurs are more exposed to errors due psychological biases by following a less mechanical strategy. This is exactly the opposite of the agent model discussed in Shleifer (2000). In addition, arbitrageurs who employ fundamental analysis to the valuation of securities are also influenced by social factors in terms of the valuation models used, etc.

Are any of the assumptions made in the literature representative of the agents (speculators, fundamentalist, etc.) in the market? Specifically, how realistic is the assumption of 'irrational' speculators who trade short-term using technical analysis. To help address these questions, the studies by Menkhoff (2010) and Schulmeister (2006) will be discussed next.

Menkhoff (2010) conducted a survey of 692 fund managers in five countries. His purpose was to examine the use of technical analysis by professional money managers. In addition, Menkhoff (2010) looked at the reasons behind the use of technical analysis by fund managers and related these reasons to the EMH framework.

Menkhoff (2010:2573) found that 87% of the fund managers place some importance on technical analysis, while 18% prefer to use it over other sources. However, technical analysis is of less relative importance when compared to fundamental analysis. However, for forecasting horizons of up to several weeks, technical analysis is relatively the most important method.

Regarding the reasons behind the use of technical analysis by fund managers, Menkhoff (2010) proposed three positions in relationship to the EMH. Menkhoff (2010: 2574-2575) states that Position 1 originates from the current financial discourse based on Fama (1970). In this view, fundamental investors are rational and investors using technical methods are of limited rationality. This will result in lower returns for the technical methods group. However, he makes the point that fund managers use technical analysis or short-term decision making and he questions the argument that this is irrational.

Menkhoff (2010: 2575) explains that the identification of technical analysis with inefficiency is a result of the idea that competitive market forces present in an efficient

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market will result in excess returns being arbitraged away after adjusting for risk. The idea of a 'normal' market return implies an equilibrium model. Menkhoff (2010: 2575) makes the point if there is not ***'an undisputed fundamental equilibrium model'*** then the use of technical analysis may be a perfectly rational tool to generate normal market returns. This view supports Positions 2 and 3.

In short, Position 1 is the current academic view that technical analysis is irrational. In Position 2, he sees technical analysis as rational due to the high costs of fundamental analysis. In Position 3, he sees technical analysis as possible rational and based on different beliefs. Table 1 below summarizes the three positions:

Table 1: The Role of Technical Analysis and Relationship to EMH

Main Characteristics	Position 1	Position 2	Position 3
Main Theoretical Viewpoint	TA is irrational behaviour	TA is rational given high information costs	TA is a different discourse based on own beliefs and info
Causes of Agent Heterogeneity	Rationality	Information	Beliefs and Different Information Sets
Agent Attributes	Irrational or less-rational	Not as well-informed – less resources to use fundamental analysis	Not as focused on fundamentals, use other information
Agent Rationality	NO	YES	MAYBE
Return vs Rational Fundamentalists	Below Average	At market level after information costs	Same Risk-adjusted Return after costs
Appropriateness of the EMH	Yes	Yes, after costs	Probably not or less appropriate

Table 1 is adapted from Menkhoff (2010: 2575)

In concluding, Menkhoff (2010: 2585) states, *'...our **evidence strongly** supports what we have called **position 3; that is the view of heterogeneous information processing in financial markets.** Users of technical analysis share the view that psychological influences are an important pricing determinant in financial markets, they tend to believe that herding is beneficial and thus rely on trend-following behavior. We also find support for position 2, indicating that high information costs of fundamental analysis may contribute to the use of technical analysis. There is **no consistent evidence for position 1** that the users of technical analysis may be in some way inferior to other fund managers.'*

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Position 3 on the view of heterogeneous information processing in the financial markets can clearly be seen in the study by Schulmeister (2006: 213) on the technical analysis in the FX markets. He finds that technical analysis widely used in the financial markets especially among currency traders where it reaches levels of around 90%. In other markets between 30% to 40% of market participants considered technical analysis as their primary trading technique.

The studies by both Schulmeister (2006) and Menkhoff (2010) show the importance attached to technical analysis by foreign exchange traders and fund managers respectively. In general, technical analysis finds stronger support in the foreign exchange market. **Thus, it seems that the financial markets harbour agents who process information in a heterogeneous fashion.** Some follow the fundamentalist path, while others follow the technical analysis path or some combination of the two paths.

Schulmeister (2006:231) then discusses three frameworks on the perception of expectations formation and how this leads to view on technical analysis. The rational expectations view assumes prefect knowledge, utility maximizing individuals, and expectations formation based on the 'unique true model.' If this were true, then technical analysis would not last very long. The second framework, the behavioral finance view, assumes less efficient markets and limits to arbitrage as a result of risk. This results in noise traders who can cause persistent mispricing of an asset. In addition, this type of trading is seen as not profitable and irrational. The third framework, **'imperfect knowledge economics'** as developed by Frydman and Goldberg (2006), assumes that **knowledge is imperfect**, **a 'unique true (fundamental) model' does not exist** due to heterogeneous perceptions of the world (like economic theories) and that **the decisions of all actors are governed not only by reason but also by emotions which are "bundled" through social interaction into "market mood,"** around some kind of fundamental "attractor" in the "imperfect knowledge economics" approach.

The third framework – "imperfect knowledge economics" has similarities to Position 3 as developed by Menkhoff (2010**). Both employ heterogeneous agents and assume that a true fundamental model does not exist.** Schulmeister (2006), in

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discussing "imperfect knowledge economics," goes further in stating that social actions are an important element.

The next question we need to ask is if the idea that there are only two main types of traders in the market, an assumption made in the literature, is realistic. Please note that there is a **third type of trader called liquidity players**, but they play more of a passive role and there net buying or selling can be assumed to cancel out, thus can be left out of this discussion. In the market, there are numerous sub-strategies using technical or fundamental analysis. Thus, the viewpoint that only two main types of agents suffice is just too simple. Additionally, a multiple views agent theory has support in the literature.

It is not surprising to find some traders using fundamental analysis while others use technical analysis, or some combination of both. Phoa, Focardi and Fabozzi (2007) look at various theories used by traders. In this study theories are not seen as absolute truths but more as interpretive frameworks arising from financial discourse based on the EMH.

Phoa et al (2007:363) state, *'There are many conflicting interpretations of security prices and price determination in financial markets. They range from academic theories based on efficient market and rational expectations hypotheses, to more traditional methods of fundamental analysis, to theories of 'value' and 'growth' investing, to chart-reading and technical analysis, to notions such as 'reflexivity'.* ***These interpretations are logically inconsistent with each other****, but they seem to coexist, sometimes even on the same trading desk.'*

Finally, in the literature, there are many studies on **heterogeneous agents** and **'multiple equilibria'** assumptions such as: Phoa, Focardi and Fabozzi (2007), Goodhart et. al (2004), De Grauwe and Kaltwasser (2012) and Hommes (2011). A more comprehensive overview of this literature is can be found in Hommes (2011). He states there are hundreds of papers using bounded rational agents with heterogeneous strategies/expectations on various markets.

To conclude, we are left with the possibility of a **framework** which consists of **'multiple equilibria' and heterogeneos agents** as possible starting points in the search of an appropiate **'typical agent' and micro-level mechanism** to employ our

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theory of financial crises**.** Both 'multiple equilibria' and heterogenous agents have been discussed in the finance literature.

In the next, we examine sociological and psychological aspects of the financial markets. Note that the framework of 'multiple equilibria' and heterogenous agents is consistent with a sociological view of markets.

Importance of Sociological and Psychological Factors

Following up from the previous discussion, Schulmeister (2006: 213 – 220) provides empirical evidence to support the **importance of the social aspect** behind FX trading dynamics. He tested 1024 technical trading models between 1973 and 1999 on the DM/$ market and between 2000 and 2004 on the Euro/$ market. He looked at the concentration of buy/sell transactions and long/short positions and trading behaviour. What he found was that most of the models implied positions on the same side of the trade and changing this side to follow a new trend took between 10 and 20 days. This process had a feedback mechanism in which traders who are using technical signals keep an eye on them and as a new trend develops there is a 'multiplier effect' that is evidenced by the strong relationship between order flows and technical trading signals.

Looking at trading behaviour, Schulmeister (2006: 220) finds that most of the models are on the same side of the market most of the time. In short, this **supports the social aspects of trading** as follows*, 'This pattern of signal generation of technical models implies that their users trade as if they were "herding" or "cascading" ...However, since every "technician" conceives a signal of his preferred model as private information, the concentration of transactions of technical models is caused by a common external factor, i.e., the logic of technical trading systems, and not by actual interactions between traders. In the taxonomy of Hirshleifer and Teoh (2003), the aggregate behavior of technical models has therefore to be considered as clustering and not as herding or cascading.'*

Using the definition of Hirshleifer and Teoh (2003: 27) **clustering gives emphasis to the technical trading systems** which represent the external factor. As stated, *'...people act in a similar way owing to the parallel independent influence of a common external factor.'* This is not an interaction among people. In contrast,

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herding means a convergence of behaviour while **cascade means to ignore your private signals and follow others**. If FX markets cluster as stated by Schulmeister (2006), then a framework based on social aspects becomes more viable for financial markets.

In general, sociological explanations are usually subsumed under the psychological explanation category in the literature. But to properly disentangle the effects of sociological factors from psychological factors, a more nuanced view is needed. definition is needed.

Thus, under the taxonomy Hirshleifer and Teoh (2003: 27), **herding** is described as interaction among market participants which leads to a convergence of behaviour. This is commonly thought of as **social, but also has strong psychological underpinnings**. As stated on the previous page, the use of models in the market leads to convergence of behaviour as a result of similar signals. This interaction among market participants results in panic or 'fear' which is considered psychological, especially during a crisis period. During normal times, interaction and convergence of market behaviour results is momentum trading or 'greed' in psychological terms. In contrast, clustering is more social since the emphasis is on an external institutional factor - trading systems. This more nuanced view allows us to better separate sociological from psychological factors.

An important **difference between psychological and sociological revolves around the determination of asset prices**. For example, the RE/EMH and psychological explanations assume that the market price can have a **'fundamental' value**, whereas the sociological explanation assumes that price is determined socially.

The idea that **price is socially determined is based on the notion of performativity**. The origins of performativity are philosophical. MacKenzie, et al (2007: 2-3) notes it was the philosopher J.L. Austin who first coined the term 'performative' and part of the pragmatist tradition of Charles S. Pierce, William James and John Dewey among others. Social scientists also developed the notion of 'self-fulfilling prophecy' which can be viewed as a version of performativity. In economics, Michel Callon (1998) is seen as the founder of economic performativity.

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The idea of a **'self-fulfilling prophecy'** has been employed in the financial crisis literature. For example, Cole and Kehoe (2000) examine financial crises (debt) brought on as a result of a loss of confidence in the government that eventually leads to a self-fulfilling crisis. Bensaid and Jeanne (2000) study the vulnerability of fixed exchange rate pegs, using the 1992-1993 crisis of the European Monetary System (EMS) as their case, to self-fulfilling currency crises. These two studies are just a small sample of literature on self-fulfilling crises.

MacKenzie (2009: 13-15) commenting on the sociology of markets emphasizes the importance of **physical equipment, conceptual equipment and communication metrics (or heuristics)**. He states that equipment matters in finance and provides an example from Preda (2004; 2006) on how the ticker help give rise to 'chartism' or 'technical analysis.' Conceptual equipment includes models such as the Black & Scholes option pricing model that results in traders employing communication metrics or heuristics such as the use of 'implied volatility' to reduce complexity to one common metric. For MacKenzie (2009: 15-16), models are seen as communication devices and the market prefers simpler models instead of complex models that slow down communication. Thus, a simple heuristic model for pricing is seen as the ideal by the market.

The difference in the price assumption has major implications in many areas of finance. In contrast, both the RE/EMH and psychological camp view market prices away from 'fundamental' as a situation that will eventually correct itself. The RE/EMH explanation attributes such movements away from 'fundamental' value as caused by 'irrational' investors and, in the end, enough 'rational' investors will bring prices back to 'fundamental' value. To further emphasize this point, **the RE/EMH explanation critically depends on the 'rational' investors to bring prices back in-line with 'fundamental' value**.

Essentially, these **'rational' investors engage in arbitrage** (loosely defined here) in order for the market to maintain some form of efficiency. Whether that efficiency is the weak or semi-strong as defined under the EMH probably depends on which market we are discussing and during a specific time period.

The sociological framework with the assumption that prices are determined socially raises two interesting questions. First, **if prices are determined socially, how can**

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arbitrage bring prices back to 'fundamental' value when 'fundamental' value does not exist? Second, arbitrage is seen as broader, in other words covering more activities or trading strategies, under the RE/EMH framework. How is it or should it be viewed under the sociological framework?

The second question on **how broad or narrow we should view arbitrage** under the sociological framework will be addressed first below. Then, the concept of 'fundamental' value under the sociological framework will be discussed.

Discussing arbitrage, Hardie (2004) states that arbitrage is not different than other market activities. In fact, all market participants seek to understand how sociological factors influence other market participants. Hardie (2004: 242) provides an example, "MacKenzie's definition of arbitrage in describing LTCM's activities is trading that seeks to profit from price discrepancies...it will be argued below that such a definition covers almost all investor trading, and therefore not specific enough to differentiate arbitrage..." Several other examples of arbitrage are provided such as 'merger arbitrage' and convergence arbitrage (bond/old bond spread). However, Hardie (2004: 243), states that *'Success is a matter of* ***market timing****, and therefore the same as any other market timing strategy.'* His **definition of arbitrage is more constricted than the one given by mainstream economics and behavioural finance.** Arbitrage according to Hardie (2004:243) is a narrower activity that includes only market activity which guarantees a profit free from credit or liquidity risk in a specific time period that matches the mandate of the market participant.

If the assumption of 'fundamental' value is replaced by the assumption that prices are socially determined and the idea that most trading activity is not arbitrage (as suggested by Hardie (2004)), then arbitrage in the financial markets is not as extensive nor as effective as we are led to believe. In addition, during times of financial crisis, the **ability to arbitrage becomes very fragile** since the socially constructed 'fundamental' prices incorporate more uncertainty.

Implications of this **narrower definition include less clarity on the difference between 'noise' traders and arbitrageurs** as discussed in Shleifer (2000). How can we tell the difference between the two under this more restricted view of arbitrage? More importantly, what are the implications for a theory of financial crises? In the

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RE/EMH and behavioural finance explanations, the idea of 'dumb' (noise traders) versus 'smart' money (arbitrageurs) is critical.

Hardie (2004: 244-245) provides an example of portfolio insurance in the 1987 stock market crash in which the **Black & Scholes option pricing model fails** to accurately provide pricing information for arbitrage to work. He states, *'Option pricing offers no riskless arbitrage profits, but reduces complicated financial instruments to a single variable, volatility. "Sophisticated participants come to understand that what is being bought and sold in an options market as volatility. (MacKenzie and Millo 2001: 50)."* The price of an individual option contract continues to be determined, as any other financial asset, by supply and demand.'

To summarize, the sociological approach has **several key assumptions** which are very different than the RE/EMH and behavioural views. First, price is seen as sociologically determined and based on supply and demand. Second, if we take the definition of arbitrage as being more restrictive as stated in Hardie (2004), then arbitrage activities have less clarity and less impact as normally portrayed under the RE/EMH and behavioural approaches. This means that the 'dumb' money versus 'smart' money view common in mainstream economics is murkier. In short, if prices are determined socially and not based on fundamental value, then the very idea of arbitrage is difficult to define or accept. Third, the use of derivatives for hedging and arbitrage offer less certainty than is commonly portrayed. Finally, emphasis is placed on knowing how other traders react to news and events since their reaction as a group determines prices, not so-called fundamental value.

Behavioral finance (BF) views **market failure as a result of non-rational behavior**. This is the second aspect of BF which is at the market level. I prefer to call this level the social version of BF since psychological assumptions which are present at the **individual social actor level are assumed to apply at the social level**. However, the view on market failure is inconsistent (or circular) since you cannot explain market failure as resulting from non-rational behavior because this implicitly assumes market behavior prior to the crash was rational to some extent. Or we have entered a new level of non-rational behavior in terms of magnitude. If as BF states, markets are non-rational as the norm, thus market failure cannot be the result of non-rational behavior by agents since you **would not be able to distinguish** between normal and failed

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markets based on non-rationality. The distinction between normal and failed markets must lie elsewhere.

Failed markets could be the result of the social aspects of markets. In other words, **markets go through periods of 'high' and 'low' social certainty** which originates from social actors. Note that this does not imply efficient markets (as exemplified by the Efficient Market Hypothesis or EMH for short) since **'social certainty' might be mistaken as EMH**. This confusion might just be **reification**. Blaikie (2007:15) states when social actors forget that they are the creators of social forms and start to believe that these social forms are natural (or through divine will), universal and absolute, this is a cognitive process known as reification. This is an especially important point for this study, since reification could explain the current importance attached to the financial discourse of EMH/Rational Expectations and/or finance theories such as the Black-Scholes option pricing formula by market participants.

This means that both EMH and BF miss the point. In order to discuss the market under the EMH and BF discourses, you need to employ both. Neither the EMH or BF can provide a comprehensive financial theory which encompasses both normal and failed markets. EMH is more useful in conditions of normality, whereas BF on the surface seems to apply more to failed markets. However, **the point of reference for BF is still the rational actor**. BF is focused on how this so-called rational actor is habitually non-rational in some ways or in certain situations. Under the BF discourse, actors can be both rational and non-rational at the same time. And this dual rationality is argued under a backdrop of an uncertain future.

Hausman (1996: 20) while discussing rationality assumption in economics, states *'...for revealed preferences will show intransitivities under conditions of conditions risk and uncertainty that have nothing to do with irrationality.'* During a crisis, BF **assumes that market participants behave 'irrationally.'** Hausman points out **decision-making under uncertainty does necessarily mean an assumption of irrationality.** Thus, using the definition of rationality as defined in economics, **crises explanations relying on BF irrationality are questionable**. Under the backdrop of an uncertain future, there can only be broad social 'consensus' or 'non-consensus.' As I have argued, it makes no sense to define it as 'rational' or 'non-rational.' The

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EMH/BF discourses **see humans as alternating between perfectly rational beings and irrational beings**, sometimes even on the same day.

People do not act 'irrationally' out of thin air. The so-called 'irrational' act occurs **since other are doing the same thing**. Thus, BF which looks at the individual at the psychological level cannot explain why crises occur. Only a socially-focused explanation can shed light on the onset of a crisis. Please note that I am defining BF in a more restrictive sense here and purposely trying to draw a line between BF and sociological explanations.

Thus, a theory of financial crises **does not need to assume rationality**. Social actors are using a discourse which implies following others. Prices are socially determined, not based (or not entirely based) on fundamental values. What we see as over or under reaction is just a social adjustment of prices under the condition of uncertainty. To emphasize the assumption or rational/irrational actors is not necessary. The price of something is what we (socially) think it is. For example, TA can easily be explained here. It is economic performity if we think of TA as a model used by market participants. Thus, the action of market participants using TA creates prices. Prices are thus socially constructed through social actors using TA.

The **EMH is a process of economic performity**. It is created and given validity by market participants. Thus, social actors who believe in the weak form of the EMH are the followers of Fundamental Analysis (FA). Thus, the weak form of EMH must work through FA to create prices in the market.

Additionally, FA could fit under STDP Theory of Financial Crises as developed in Chapter 5. If we use Bhaskar's (1979) version of the Retroductive RS, he sees the world under the epistemology of Depth Realism which is a view of the world having three domains of reality – the empirical, the actual, and the real. In terms of how FA fits different frameworks it would work with both the EMH and STDP Theory. In other words, in a multi-level view of the world both the EMH and STDP Theory could run parallel to each other. Additionally, the concept of reification as noted in Blaikie (2007:15) could be relevant in explaining how both the EMH and STDP can co-exist.

The argument in the last paragraph is suggesting **that two realities could exist supported by either the epistemology of Depth Realism (Bhaskar) or by the**

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concept of reification. For the purposes of this study, the assumption of one or more realities co-existing will be taken as given without further delving into philosophical arguments. Under this assumption, the EMH would represent the 'Ideal' or perfection. The STDP Theory developed in Chapter 5, would represent multiple realities of the world using trading discourses – TA, FA or Macro – to create prices under an economic performity process.

Additional insight is provided by Frydman and Goldman (2011: 3) **critic the idea that psychological biases are systematic, in fact they use the term 'mechanical.'** This mechanical view of agents has its roots from a financial discourse *'...which stems from contemporary economic models' portrayal of individuals as little more than robots.'* Both the rational economics and behavioral economics are criticized of making the same mistake – mechanical view of agents. Both sides somehow know how agents act – either rationally or psychologically/socially. That is with prescribed rules.

Now discussing the similarities and differences between the EMH and BF, Frydman and Goldman (2010: 10) state that in the **rational markets view the actors are efficient calculating machines while in the behavioral view the actors are prone to mistakes and are inefficient machines**. Both ways of economic thinking use actors in mechanistic sense in fully predetermined models that see the future from the past. '*Paradoxically, market-failure and bubble models, which were supposed to expose the rational market as a myth, ended up reinforcing its mythic significance.*' In short, if irrationality were illuminated or minimized, then the rational actors would bring prices to their real fundamental values.

Frankfurter et al (2004: 449) state that the role of behavioral finance has thus become *'...to discover and remedy deviations from rational choices, presuming that if people do not behave according to the prescription of theory, then something is wrong with the people and not with the theory.'*

The importance of this assumption cannot be understated. **If psychological biases are systematic and transcend to the societal level,** then the **EMH along with behavioral finance** (to account for the anomalies) would suffice. However, if

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psychological biases are not systematic and thus do not transcend to the societal level, then a social – constructivist paradigm is likely more appropriate.

This question regarding the merits of so-called 'psychological biases' is addressed by Fenton-O'Creevy et al (2005). **Instead of 'psychological biases' they use the term 'emotions.'** The qualitative study interviewed 118 traders and 10 managers from four investment banks in the City of London. Fenton-O'Creevy et al (2005: 105-106) state in the conclusions that a more nuanced approach is needed, where emotions regulation strategies, intuition ('gut' feeling) and reflexivity provide positive decision-making benefits for traders. They see trader emotions and cognition as being linked and the result is less or more effective strategies in utilizing emotion for their benefit.

What Fenton-O'Creevy et al (2011: 1056-1057) found is that **emotion regulation is critical for success in trading**. Strategies used by high performers were different than low performers. High performers coped with negative feelings and reflected critically on intuition and feelings. Low performers avoided negative feelings and did not reflect critically on intuition.

Additional insights provided by the Fenton O'Creevy et al (2011: 1058 - 1059) study revolve around **social context and reflexivity**. They point out that traders, as in all work contexts, are **under social pressure to conform to the norms of the profession**. New entrants to this world quickly learn not to show strong emotion and take the view that their work employs rational decision-making and that emotions can be dangerous. For the less experienced traders, a higher status is placed on the 'rationality' of markets. Thus, the impact of the EMH discourse in combination with social norms influences the viewpoint of traders. In contrast, more experienced traders welcomed emotion as important information and possibly a warning signal. They are also keen to interpret what others in the market think and place importance on their prior experience.

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Incorporating Political Factors

In this section, we split the literature of political factors into two frameworks: known/somewhat predictable or know or unknown/difficult to predict. These frameworks are best described as ‘confidence’ or ‘uncertainty’ respectively.

Framework I: ‘Confidence’
Politics-Specific: Known/Somewhat Predictable

Of the two political frameworks, this one is more ameanable to modeling and even prediction by some market strategies such as: Global Macro and Emerging Markets Funds. The key policy-makers are the executive branch of the country, either the President, Prime Minister, or authoritarian leader depending the political system. Technocrats working in the treasury or central banks play a secondary role here. It should be noted that each group of policy-makers has different objectives and constraints, thus it is important to distinquish who makes the final decision. Of course this will also depend on the type of political system, and country in question.

Framework I is more ameanable to **game-theoretical modeling** since the room for political maneuver is more defined, in a sense more constrained. As stated earlier, the it generally affects **‘confidence’** with an example being a currency (FX) crisis.

The work of Backus and Driffill (1985a: 211-212) discusses policy credibility and the idea of different types of actors. They use a reputation model developed by Kreps and Wilson and Barro along with Gordon’s macroeconomic policy game framework to examine the problem of credibility with different types of policy actors – strong and weak governments. In the study, the research question is focused on government policy regarding disinflation. In short, they want to know why governments do not follow a *‘more gradual, less painful, course...’*

The answer has partly to do with the **credibility of government policy**. If the track-record of the government was poor, this would result in low confidence in the government. Additionally, if the government is new and has no track record, then it is difficult for market actors to judge intentions and more importantly to guage policy

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credibility. For example, according to Backus and Driffill (1985a: 219-220) weak governments are faced with an impossible goal which results in a *'credibility problem.'* In short, the market actors do not believe the government can carry out a policy that is dynamically inconsistent. In another study concerning the question of why governments have accepted high rates of inflation over long periods, Backus and Driffill (1985b: 533) discuss the importance of reputation for policy credibility. They state, *'The central feature of the model is the government's ability to manipulate its reputation.*

The point here is that there is interaction among government policy makers and market actors. Moves and countermoves impact reputation which impacts **'credibility' and thus 'confidence.'** Thus, it is not a strech to see how 'confidence' during a currency (FX) crisis plays out similiarly.

Agénor and Masson (1999) look at credibility and reputation during the Mexican Peso Crisis. Their model finds that the expectation of devaluation can broken down to the probability of government policy actors not placing enough weight on FX stability and to the probability of exogenous shocks increasing the attractiveness of devaluation as the preferred policy choice. Agénor and Masson (1999: 70) state that economic fundamentals had an impact on the credibility of Mexican policymakers and FX expectations prior to the collapse of the peso. Using **the idea of type of policymaker as a proxy for reputation**, they view credibility as composed of two elements – the type of policymaker as a proxy for reputation and policy commitment (credibility) which is based on the **probability of the policymaker sticking to policies** in an worsening environment.

The model by Agénor and Masson (1999: 73) tries to capture both the reputation and credibility factors. Policymakers have a choice of devaluation or not. The market actors form expectations that assess the **probability of devaluation** based on type of policymaker (reputation) and policy commitment (credibility) that varies depending on FX reserves and the severity of the shock. Addionally, Agénor and Masson (1999: 74) note policymakers can be seen as **'weak' or 'strong'** and that market actors can combine this with playing to the interests of domestic groups in determining a probability of default. Finally, political events, such as the assassination of Colosio

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during the Mexican election, affect perceptions regarding government actions and policy intentions.

Thus, **Framework I is ameanable to modeling**. Although the model is not perfect and can never capture all facets of reality, it might just be good enough as a framework for certain market actors to profitably speculate on the outcome. For example, the Leblang and Satyanath (2008: 480-481) study **offers some support** for this view indirectly. 'They state, *'...it is widely acknowledged that political factors contribute to currency crises ...We show that the inclusion of political variables into diverse crisis models substantially improves their out-of sample predictive performance.'*

In contrast, Rother (2009: 132-133) concludes that the **inclusion of political factors in models yields poor to marginal results**. He states, *'Regarding overall model performance, various statistical test procedures revealed that adding political variables slightly increases the efficiency of the models, as the higher explanatory power is not fully offset by additional complexity.'* However, the results from a theoretical analysis using the four case studies were much stronger for the left-leaning governments, election year, incumbent time and high veto player variables. This might mean that informal, less mathematical models, might be more useful to market actors who are speculating on currency crises.

This **importance of market intuition based on politics** is further supported by Setzer (2006: 165) in his discussion on identifying speculative attacks. He states, *'... the decision to attack depends on the markets' expectation about the politicians' commitment to the peg, one might expect that politico-economic factors are important determinants of a market's perception as well.'*

If we examine the results of the study on speculative attack specification by Selzer (2006: 168-172), it becomes evident that market actors could employ heuristics or 'rules of thumb' in deciding to speculate or not to speculate against a currency.

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Framework II: 'Uncertainty'

Macro-Policy Environment - Known or Unknown/Difficult to Predict

Framework II: Macro-Policy Environment is more complex. In a stable environment, prediction is easier and possible. In an unstable environment, it is not as ameanable to modeling or even prediction. Additionally, the policy-makers are different from the policy-makers under the Framework I: Politics-Specific. The primary policy-makers here are technocrats working in the central bank and also the treasury.

As discussed earlier, politics also affects **'uncertainty.'** When 'uncertainty' becomes the primary impact of politics, then all risk frameworks are affected. In this circumstance, politics is not generally a trigger but an overhang on the market in the form of 'uncertainty.' Examples are **monetary policy decsions at crucial moments** and policy-making during a crisis.

Thus, **Framework II: Macro-Policy Environment is present in highly uncertain times of policy making during the business cycle or during crucial moments in a crisis**, with the crisis generally being a severe one. Our focus here is on the difficult environment policy makers face in such a situation and on the dynamics behind the decision making. In an uncertain environment, the transparency of central banks becomes crucial for actors in the financial markets. In addition, the process of policy-making becomes more contentious in uncertain environments since changes are likely to be implemented.

In my prior study, Diamondopoulos (2012: 235), I show that **transparency of monetary policy is difficult to measure and define**. It is more than just the information provided to the the public according to Tomljanovich (2007: 794). For example, de Hann et al. (2005: 83-84) state that it is possible for the public to have a clear view of central bank policies and at the same time there is hardly any information provided to the public by the central bank. And the ververse is true, the central banks provides lots of information but the public does not have clarity. '...*One of the crucial factors, of course, is the quality of information provided.'* In short, **more information does not lead to greater transparency**. In an uncertain environment, what market actors are interested in is information related to procedural disclosure and this type of disclosure is provided in the form or minutes/voting records.

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On the relative transparency of the major central banks the **link between the publication of central bank minuts/voting records, uncertainty and financial markets**, I state, *'...the connection between the concept of uncertainty and the importance of minutes in reducing uncertainty for the financial markets could be instrumental.'* Thus in my study - Diamondopoulos (2012: 236-237), I agrees with Issing et. al (2005) as discussed next.

Issing et al. (2005: 1-3) states that central bankers are also operating in an **uncertain environment and that imperfect knowledge**, limited information and means that they are also prone to errors. However, uncertainty for central banks takes on an additional complexity in that central banks need to be aware and to take into account the reaction of market actors based how they understand and interpret central bank actions. Market actors are also aware of this additional complexity faced by central banks. And that is probably why they ***'place less weight on things like economic reports and more weight on predicting how the members of the monetary committee might vote in specific situations****. This means that* ***minutes/voting records*** *gain more importance from the viewpoint of the market. ...****the outsiders (the market) need to see the logic of the decision-making process.*** *...minutes/voting records are important pieces of information for the market to follow the logic of central bank decision-making.'*

This importance to the FED is also pointed out by Abolafia (2005: 207) in his statement, *'Every bond trading floor, whether in a bank or securities firm, employes economists, know as Fed watchers. They closely monitor the Fed's policy announcements and its reports on the economy, attempting to predict their contents.'*

Abolafia (2005: 207) looks at monetary policy decision making by studying the October 6th meeting in 1982 through verbatim transcripts of the closed-door policy meeting. This was an important meeting since the Federal Open Market Committee (FOMC) was deciding on a major change, the abandonment of a chief policy tool – monetary targeting (M1). He states, *' The process of building consensus was cotentious and members strongly contested each other's interpretations...'* Abolafia (2005: 208-209) see framing as primarily a political act designed to contest or keep the existing status quo.

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Abolafia (2005: 209) discusses the time factor in the shaping of framing moves. In essence, this can be backward-looking or forward-looking all mixed with the present. Under stable conditions the framing moves are expected to maintain the same policies from meeting to meeting. In unstable conditions the framing moves are likely to be broader and to challenge the existing policy. An important point here is for the political entreprenuer to pocess the necessary social skills to change policy.

In unstable conditions, when framing moves challenge existing policy, we can break down the study of Abolafia (2005: 211 – 226) into an **eight-step framing process**. The eight steps are: Collective Questioning, Calibrating the Shock, Rejecting the Old Frame, Aligning Moves, Projecting New Frames, Debating the New Frame, Enrolling Allies, and Adjusting the Frame: Practical Interpretive Politics.

It is clear that the process can lead to mistakes in either choosing to pick the right new frame or by failing to convince a sufficient amount of others to change policy. This makes **policy mistakes highly likely in an very uncertain environment**. For example, the 07-08 Credit Crunch is an excellent financial crisis to examine since numerous policy mistakes were made that affected 'uncertainty' to a large extent.

Additionally, studies have been conducted as the to the **ideal size for the monetary policy committee**. For example, Berger and Nitsch (2011) find that the ideal size for monetary policy committees is somewhere between five and nine members. A related line of study looks at the quality of committee decisions. Blinder and Morgan (2005) find that group decisions are not slower than indivdual decisions, group decisions are on average slightly better than individual decisions and group interactions matter (not just simple mechanical rules).

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Chapter 3: Research Design and Methodology

Theory Creation: STDP Theory of Financial Crises

Abstract

The purpose of this paper is to develop guidelines on theory development using Abduction & Retroduction. This fills a gap in the Abductive literature on how to better operationalize theory development. This is accomplished by using a case study research approach along with process-tracing and other methods that are consistent with the growing literature on multi-methods research. The development of a process-oriented financial crisis theory is the goal.

Key Words: Theorizing, Abduction, Retroduction, Process-Tracing, Multi-Method

Overview of the Study

The main objectives of this study are to gain understanding through the point of view of traders and to focus on explanation through the development of a theory of financial crises that incorporates the social and political context by looking at the process of how a crisis unfolds. In short, the focus is on the development of a process-oriented theory of financial crisis. We address the following question:

Why do financial crises happen?

This research question focuses on explanation while also incorporating an understanding from the point of view of the actors. The result is a 4-step model that explains the process of financial crises. To address this research question, this chapter has three parts, as follows:

In **Part I: Theory Development and Research Philosophy**, we review the relevant theory development literature and outline the use of the Abductive and Retroductive research strategies from a philosophical point of view. In the end, two tables will summarize the main philosophical assumptions under each research strategy.

In **Part II: Research Methodology**, a discussion of case studies as the main research methodology is followed by our delineation into two types of case studies focusing on the Abductive and Retroductive research strategies. Under each type, we provide a discussion of compatible research methodologies – process tracing, content analysis,

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thematic analysis, and surveys. The quasi-experimental studies are discussed in Chapter 4 and are only briefly mentioned here. In addition, we provide an overview of how the Abductive RS is implemented and fits into theory development.

In Part III: Implementation of the Retroductive RS, utilizing process-tracing as a heuristic provided a practical way to operationalize theory development**.** Critical to the theory development process were the use of thought experiments and counterfactual thinking that took place over several years. This was especially the case regarding the development of the 4-step macro mechanism and link with a disruption mechanism in the process-oriented theory of financial crises.

Part I: Theory Development and Research Philosophy

The guidelines on the theory development process are not as clear and developed as theory testing guidelines. This is mostly due to the nature of theory development.

Swedberg (2014) in an edited book titled, '*Theorizing in Social Science: The Context of Discovery,'* emphasizes the **'process of theorizing'** with a focus on the creative elements. He acknowledges that although the development of specific rules for theorizing well may not be possible, certain steps are needed, nonetheless. These steps should include observation, helpful analogies, metaphors, typologies, etc. before producing a plausible explanation. Knorr Cetina articulates the concept of *'Intuitionist Theorizing,'* that requires the use of long-term memory. The important point made is that the **process is implicit** not explicit and **intuitive instead of reflexive**. In addition, Rolan Paulson points out that the **use of counterfactuals** can play an important role in the creative process of theorizing. Finally, Neil Gross points out that **pragmatism** particularly the work of Charles Pierce has influenced many of the authors.

Mabsout (2015: 493-494) states that Pierce saw Abduction (a third mode of logical inference) as less restrictive regarding logical rules compared to induction or deduction. He states, *'Unlike deduction which operates under mathematical necessity, abduction (and induction) is amplificatory.'* In short, this means that the theoretical explanations (outputs) contain additional information that require you to go beyond the data (inputs).

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Meyer and Lunnay (2013) also notes that the use of retroduction requires the need to go beyond the empirical data. Since it is **not as logical of an approach like deductive, the empirical data need not be as rigorous**. To employ the Retroductive RS, a researcher needs to **utilize 'assumptions' to explain**. In short, it is an instinctive mode of inference.

Mabsout (2015: 495) points out that, *'For Popper, there is no logical method or rational principle for producing new ideas. The context of discovery is psychological one as every hypothesis contains an 'irrational' element, a creative intuition.'* This point from Popper, is also echoed in Blaike (2007: 76).

In addition, Mabsout (2015: 495-496) points out three key insights from Herbert Simon (1977). First, theory generation is the most valuable scientific activity. Second, **theory testing or validation and discovery are inseparable**. Here Simon notes that abduction is still undeveloped and that *'...theory generation provides itself an initial validation.'* Finally, the version of abduction put forth by Simon is more limited in scope and resembles computer program and problem-solving algorithms.

Abduction according to Charles Pierce, the American philosopher, abduction has its own unique logical process. It starts with data or facts that need explanation. Then it looks for the best possible solution to explain the fact or data. This mode of inference resembles detective work. Abductive reasoning for Charles Peirce, is defined broadly. Haig (2005:377) further builds on this broadly defined abductive reasoning with new insights from philosophy and artificial intelligence. The abductive method as seen by Haig (2005) is a broad theory of scientific method. Thus, the inductive and deductive methods are subsumed within an abductive broad theory of scientific method.

Haig (2005:371) points out that these two methods should be looked at as more restrictive and designed for specific research goals. According to Haig (2005:371-372), the inductive method discovers empirical generalizations and that the deductive (hypothetico-deductive) tests hypothesis and theories in terms of predictive power.

Haig (2005:372-373) states that once robust empirical regularities or phenomena are detected, then an abductive process is used to infer the underlying causal mechanisms. Haig (2005:371) writes, *'The construction of explanatory theories is shown to involve their generation through abductive, or explanatory reasoning.'*

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Generating theory under the inductive model would mean developing a theory mainly from observations (empiricism). Benton and Craib (2001:35) state that theory invention requires imagination and creativity. Theories are invented after reflecting on generalizations from observations. This is a different process from the one used by the empiricist.

Haig (2005) and Pierce used the terms abduction and retroduction interchangeably. In contrast, Blaikie (2000 and 2007) defines abduction in a more restricted sense. In his definition, abduction is employed to gain understanding from the point of view of the actors. According to Blaikie (2000:77) in the **Abductive Research Strategy (RS)**, the researcher becomes a student and seeks to be taught by people being studied. The goal is to see their world as they see it and to re-describe lay accounts into scientific language. The objective is to both describe and understand. In fact, Abduction is the only research strategy that addresses the objective of understanding. The meaning of understanding, as specified here, is **to see the world from the social actor** point of view.

For Blaikie, the task of theory creation falls under a research strategy called retroduction. The **Retroductive Research Strategy (RS)**, according to Blaikie (2007:102) is then used to search for explanatory mechanisms of which social actors are unaware. This combines the understanding gained from the point of view of the social actors with an explanatory account offered by the Retroductive RS. Thus, the Retroductive RS is focused on the **'structures and mechanisms'** that explain regularities.

Saether (1998:245) argues that retroduction improves upon a purely inductive (evidence) and deductive (social theory) with better linking through a continually evolving, dynamic process. Importantly for theory creation, abduction and retroduction are based on cyclical or spiral processes. Abduction is only used in the social sciences whereas retroduction can be used in both social and natural sciences.

As discussed earlier, abductive inference under Peirce and Haig is defined as broader than under Blaikie. Peirce used abductive and retroductive interchangeably. For the purposes of this study, **we use the definition of abduction as put forth by Blaikie (2000 and 2007)**. This modern version which sees the processes as separate has a purpose of improving clarity overall. This is similar to the approach taken by Meyer

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and Lunnay (2013). In their study, the authors follow Danermark et al. (1997) on abduction by splitting the process into two – abduction and retroduction.

In this study, there are several reasons behind this decision. First, the use of the abductive and retroductive research strategies (RS) can be compared to the inductive and deductive research strategies (RS) easier, thus facilitating comprehension. Second, the definition that Blaike (2000 and 2007) employs is based on how these research strategies are specifically employed in the social sciences which is more relevant for this study. Third, these research strategies could be viewed in a similar manner to the inductive and deductive research strategies (RS), but with the important differences as we discussed earlier. Finally, the approach taken by Blaike (2000 and 2007) allows us to employ the deductive RS in place of or in combination with the retroductive RS to test the theory.

In addition to the reasons mentioned earlier, there is a one additional reason for splitting the process into abductive and retroductive. The Meyer and Lunnay (2013) study **integrate abduction/retroduction with critical realism**. Thus, they can distinguish between the actual and real under the critical realist philosophy.

The link between abduction/retroduction and critical realism is also present in several other studies, most notably information systems research. This includes studies by Wynn and Williams (2012) and Zachariadis et al. (2013) among others. For example, Mingers et al. (2013: 797-798) specifically tie in critical realism and retroduction. They state, *'...what Bhaskar calls retroduction (this is essentially the same as "abduction" as developed by C.S. Pierce ...So, we move from experiences in the empirical domain to possible structures or mechanisms in the real domain.'* They note that this is the critical step in critical realism and these experiences in the empirical domain result in causal mechanisms some of which might be non-observable.

Mingers and Standing (2017: 173-174) provide additional insights on causation and the link between critical realism, mechanisms, abduction and pragmatism. Critical realism has three domains (real, actual and empirical). It is in the real or the external that mechanisms or structures exist. Causality here is in the form of 'generative causality' versus Humean causality. In short, the interaction of mechanisms or systems at different levels generates events. They note that *'...the absences can be causes, and that human agents are obvious example of mechanisms with causal*

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powers. This leads to a methodology based on abduction rather than (or perhaps as well as) induction or deduction.'

To better integrate this philosophically, we need to establish **complimentary ontological and epistemological assumptions.** Blaike (2007: 13-17) breaks down ontology into two crude mutually exclusive categories – idealist and realist. A purely idealist view sees the external world as having *'no independent existence apart from our thoughts.'* In contrast, a realist theory assumes both the social and natural world as existing independently.

The existence and relevance of the external world has some variation under the **idealist ontology,** it can be completely rejected (atheistic idealists,) or accepted with just different ways of seeing it (perspective idealists). Constrained idealists, for example, accept the existence of an external world, but see socially constructed worldviews as being autonomous but slightly constrained by the external world. The main position of idealist is the social and physical world are fundamentally different, since humans have culture and shared interpretations of the world. This makes human behaviour meaning giving.

Under the **realist ontology**, there are extremes such as shallow realism (or naïve realism) associated with the doctrine of naturalism that believes in little difference between the natural and social world. It also assumes that what is see is all that is there or exists. Thus, the implication is that there are no hidden or unobservable mechanisms behind events. Cautious realism shares many of the same beliefs as shallow realism but do not believe humans can uncover the independent external reality due to imperfect human senses.

Sitting somewhere in the middle of idealism and realism and can arguably be included in either camp is conceptual realist (or objective conceptual realism). This ontology relies on reason rather than the senses and is the construction of a social community not individuals. More like a collective mind or consciousness.

Conceptual realism is relevant to the financial markets and to The STDP Theory of Financial Crises is due to a cognitive process called reification discussed in Blaikie (2007:15). When social actors forget that they are the creators of social forms and start to believe that these social forms are natural (or through divine will), universal

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and absolute, this is a cognitive process known as **reification**. This is an especially important point for this study, since reification could explain the current importance attached to the financial discourse of EMH/Rational Expectations and/or finance theories such as the Black-Scholes option pricing formula by market participants.

Subtle realism emerged due to the shortcomings of shallow realism and idealist ontologies Blaike (2007:17). There is a belief in existence of an external reality and this is assumed to be a result of interactions of social actors. It has elements in common with the ontology of depth realism which will be discussed next. However, it does not include the idea of ontological depth found in depth realism.

Depth realism has ontological depth made **up three domains: empirical, actual, and the real**. Blaike (2007:16) notes that this view originates from Bhaskar (1978). The empirical is experienced through our senses, the actual cover observed and unobserved events and the real involves the processes or mechanisms that generate these events.

Since the **Abductive RS has ontological assumptions** that social reality is the social construction of social actors. This ontological position **means that social reality is relativist** – multiple and changing social realities. Each social reality may be the 'truth' to that particular group of social actors. Thus, under the ontological categories defined by Blaikie (2007:13-17), the **idealist or subtle realist ontology** are appropriate for the Abductive RS. Additionally, a **case can be made for depth realism**. Blaike (2007: 88-90) argues that abduction is based on an idealist ontology and an epistemology of constructionism.

If we accept the nature of social reality under the Abductive RS taken as idealist (or subtle realist) – socially constructed, this has implications for the kind of epistemological assumptions that can be used to establish scientific knowledge claims. Under the epistemological categories defined by Blaikie (2007:22-23), the **constructionism epistemology** is appropriate for the Abductive RS. Constructionism takes the view that knowledge results from the needs of people trying to make sense of the world. This can be done by individuals or society. Our interest in this study is in social constructionism (collective meaning giving).

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As such, the epistemological assumptions in Abductive RS see knowledge as a derivative of socially constructed everyday concepts and meanings. However, the Abductive RS in **using the epistemology of constructivism poses a dilemma**; which is a result of the researcher taking an 'insider learner' posture to the social actors being researched.

The dilemma is **how much weight to place on the expert knowledge** of the researcher versus the **lay accounts given by the social actors**. The answer depends on the epistemological assumption of a single social reality or multiple realities. If the viewpoint is a single social reality, then expert knowledge should bear more weight. If the viewpoint is of multiple realities, then the epistemology of constructionism is accepted, and the lay accounts given by social actors should bear more weight. Blaikie (2007:45)

Next, we need to achieve **complimentary ontological and epistemological** positions with retroduction. Philosophically, the Retroductive RS falls under two camps – Bhaskar or Harre. Under the Bhaskar version, as discussed earlier there are three domains of reality in depth realism. Bhaskar uses **depth realism** as his ontology which strongly sees the existence of an independent social reality. Depth realism thus has ontological depth and follows the **epistemology of neo-realism**, which places an **emphasis on the structures or mechanisms** not the patterns or regularities of empiricism. Blaike (2007: 22) states that neo-realism rejects the empiricist model of establishing regularities only to achieve explanation. Under neo-realism, you need to go further by uncovering the processes or mechanisms that produce these regularities. Therefore, **only tentative knowledge** can exist under this epistemology.

Harre, on the other hand, takes the ontological position of subtle realist which states the possibility of the existence of an independent social reality. His epistemological position is constructionism. This viewpoint aligns better with the Abductive RS.

However, the **ontological and epistemological positions of Bhaskar match better** with the Retroductive RS as employed in this study. This is an important distinction, since each camp provides a different source of explanation to why questions. Tables 2 and 3 on pages 58 and 59 respectively summarize these positions.

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TABLE 2: ABDUCTIVE RS – Philosophical Assumptions

Source: Developed by John Diamondopoulos using source material from Blaikie (2000 and 2007)

Philosophical Foundations	Philosophical Assumptions	Clarification and/or Logic
Ontological What is the nature of social reality?	Idealist or **Subtle Realist** Note: case can be made for **Depth Realism** (thus compatibility with Retroduction	Reality is what people make of it. It is subjective with more than one reality. Social world has culture and meaning-giving unlike the natural world, this is reality.
Epistemological How can reality be known? What is the nature of knowledge?	Constructionism	This is the outcome of people making sense of the world. Constructionism is associated with the idealist ontology. Rejection of Empiricism (no theory-free observations). All observation is theory-laden. Relative knowledge. Meaning-giving either individually or socially (relationship between these two is an important key for Abductive RS).
Research Paradigm	Interpretivism	Origins in Hermeneutics and phenomenology. Requires an understanding of the world people reproduce (social science). Concerned with understanding meaning in terms of rule-following. Rejects methods of natural science which use an 'outside' approach.

The Abductive RS and Theory Building

Iterative Process: 'alternating periods of immersion in the real world with periods of withdrawal for reflection and analysis. This means that theory is part of the research process, not generated in the beginning or end (Blaikie 2007).

Lay to Scientific: constructing theory grounded in everyday activities and/or in the language and meaning of social actors. Second order constructs (social scientists' ideal types must be derived from first order constructs or 'everyday typifications constituting the reality of the social actor.' (Blaikie 2000 and 2007)

'Insiders' Social Model: the goal is to generate an explanation using 'ideal' types from everyday accounts. Need to stay close to original language to minimize error. (Blaikie 2007)

Philosophical Underpinnings: Schultz, Winch, Douglas, Rex, Giddens, Gadamer and others. Only applicable to social sciences. Pierce combined Abduction & Retroduction.

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TABLE 3: RETERODUCTIVE RS – Philosophical Assumptions Source: Developed by John Diamondopoulos using source material from Blaikie (2000 and 2007)		
Philosophical Foundations	**Philosophical Assumptions**	**Clarification and/or Logic**
Ontological What is the nature of social reality?	**Depth Realist**	Depth Realist takes a strong view of the existence of an independent social reality.
Epistemological How can reality be known? What is the nature of knowledge?	**Neo-Realism**	Depth Realist - Neo-Realism under epistemology. Neo-Realism places an **emphasis on the structures or mechanisms** not the patterns or regularities of empiricism. Knowledge can only be tentative.
Research Paradigm	**Critical Realism**	Emerged as an attack on positivism and critical rationalism (Popper and falsification). UK origins.
The Retroductive RS and Theory Building **Roy Bhaskar's Definition:** Blaikie (2000) states that 'retroduction' refers to the use of reason and imagination to create a picture or model of the structure or mechanisms that are responsible for producing observed phenomena. The task is to try to establish their existence. The logic involves moving back and forth from observations to the creation of a possible explanation.' **Goal:** to discover a previously unknown structure or mechanism through the construction of a 'hypothetical' model. **Addresses 'Why' Questions:** either through social structures external to social actors (struturalist view) or socially constructed rules of behaviour (constructionist view). The constructionist view is 'bottom-up' like Abduction. **Philosophical Underpinnings:** Pierce combined Abduction & Retroduction. Plus Harre, Bhaskar, Secord. The Retroductive RS can be used in both the natural and social sciences.		

It is important to stress **the ontological link aligning these two research strategies is depth realism (Bhaskar) and subtle realism (Harre).** Since Harre uses subtle realism he acknowledges the possibility of mechanisms. It is this possibility of mechanisms that allows us to use depth realism (Bhaskar) under the retroductive ontology. In short, subtle realism is a **compatible ontology** with the depth realism. The main difference is that subtle realism lacks the ontological depth of depth realism as discussed earlier. Making this choice fits with the **critical realist** view of the world as expressed by Manicas (2006: 2-5), who views understanding in both natural and social sciences as requiring a causal mechanism, but in the social sciences we need to consider that humans construct the social mechanisms.

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Part II: Research Methodology

The focus now turns to appropriate research methodologies that are compatible with the Abductive RS and Retroductive RS. Blaike (2000: 274-276) states that the abductive strategy, as well as other research strategies under the interpretivist label, the focus is on the meanings, motivation and interpretation of the social actors thus qualitative methods are primarily used. However, qualitative data may be used in furthering the process of understanding and explanation. For the Retroductive RS both quantitative and qualitative methods can be employed. Mixed methods can fall under a single approach or paradigm or in sequence. Yin (2009:13) provides examples such as a survey within a case study or vice-versa.

In this study, several research methods are employed, with **case studies** the main approach. Within the case studies, we utilize several **research strategies** such as: process tracing, quasi-experimental studies, content/thematic analysis, and surveys. Based on our research goals, case studies are ideally suited for the purpose of theory development.

Yin (2009:2) notes that *'In general, case studies are the preferred method when (a) "how" or "why" questions are being posed, (b) the investigator has little control over events, and (c) the focus is on a contemporary phenomenon within a real-life context.'*

In addition, Robert Stake in Gomm et al (2009:19), George and Bennett (2005:9) and David de Vaus (2006:235) all agree on the importance of case studies in reference to incorporating and capturing 'real-life' context.

Investigators have little control over economic events, such as crises. The historical and social context of different crises can vary; thus, the case study method has natural advantages when **studying events in open systems**.

Thus, the **case study research methodology** was adopted as the main approach in this study. First, we split the case studies into two types – Abductive RS and Retroductive RS. This is done to show the appropriate research methods under the two main types of cases studies. Then under each type, we discuss the practical implementation of the research strategies. The diagram 1 on the next page provides a general outline on how the case studies were structured.

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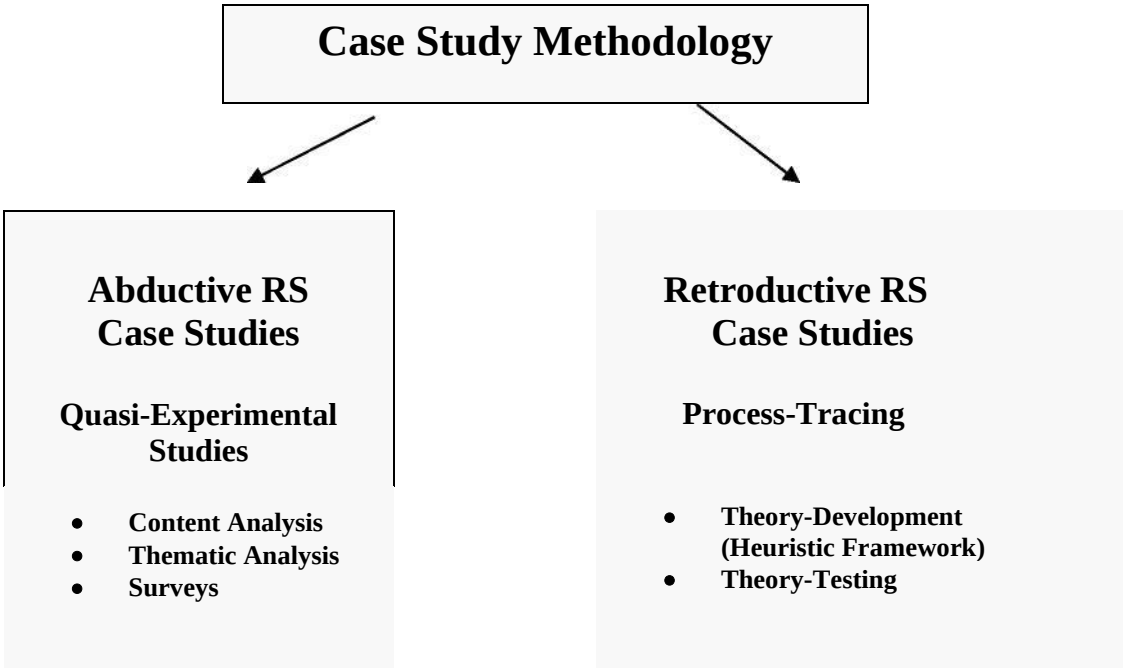
Diagram 1: Case Study Methodology under the Abductive RS & Retroductive RS



Case Studies (Abductive RS)

Research Methods Employed: content/thematic analysis & surveys

Note: the quasi-experimental study provided the data for the case studies

The goal here is to provide a more realistic explanation of how actors think and make decisions in the financial markets for the purposes of supporting a process theory of financial crises. To accomplish this, we need to re-describe lay accounts into scientific language. This section will present a general overview on the Abductive RS, specific details will be presented in Chapter 4.

To accomplish this goal, we conduct a **quasi-experimental study** that provides us with the data: cases. For our purposes, the case study method fits within the Abductive RS since the point of view of the actor can be emphasized and this is the key in developing understanding. Gerring (2009:39-40) also mentions the importance of abduction in the context of theory generation along with important shared attributes with case study research.

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Implementation of the Abductive RS

In this part, the practical details of implementing the Abductive RS will be covered. First, a set of principles for the Abductive RS will be provided and then how then an overview of how the Abductive RS was implemented in this study.

Blaikie (2000:116) produces a set of principles for the Abductive RS, as follows:

1. The accounts that people give of themselves and others is the heart of any social world.
2. This account is provided in lay language and contains concepts, the meaning of these concepts and theories of the social world.
3. Most of social life is routine and not reflected upon.
4. Actors only search for construct meanings and interpretations when asked about their behaviour, their world is disrupted or when things become unpredictable.
5. Social scientists must use procedures to uncover these meanings and theories.
6. Then these fragments of meanings must be pieced together.

Blaikie (2000:117) states that theory development **using abduction is based on two steps**. First, a description of every activities and meanings (lay language) as seen from the social actors' point of view and second, the development of the categories or concepts (scientific account) that help us understand and explain.

Thus, the **first step of the abductive process** was based on a quasi-experimental study of three cohorts (2010 to 2012) of postgraduate students (MSc Global Banking and Finance Programme at the European Business School – London, Regent's College) engaged in a virtual trading exercise. The **quasi-experimental study** provides the data for the case studies that is analyzed through **content analysis** combined with **thematic analysis** and **survey** (questionnaire). Analysis of the quasi-experimental study is subjective and depends on the **background and ability of the researcher**.

To achieve understanding from the point of view of the students (social actor), we asked three agency-specific questions, two dealing with social context and one dealing with political context. The first question - **Why do traders hold certain views of the market?** – seeks to understand the way in which traders see the market. The second question – **What is the role played by reflexivity and financial models?** – deals

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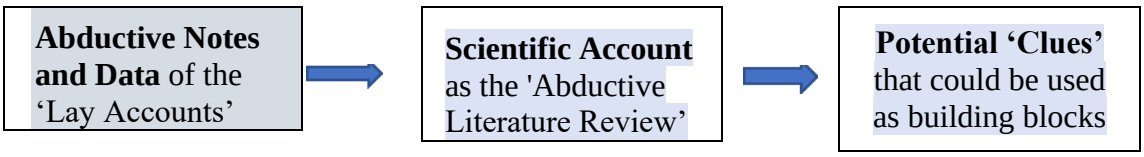
with an understanding regarding trader views such as sociology and financial models/discourse. Finally, the third question – **How are politics and political constraints faced by governments accounted for by traders?** – seeks to understand how traders incorporate political factors into their decision-making.

The **second step of the abductive process** is producing a technical (scientific) account from the lay accounts. It is the technical (scientific) account that is a key outcome. Therefore, the l**iterature review** based on the abductive process (Chapter 2: Part B) provides a critical contribution towards theory development.

To operationalize the Abductive RS, we add a **third step to the abductive process.** The literature review based on the abductive study relies on the analysis/interpretation of the researcher. This leads to certain academic literature (scientific account) thus helping to provide **insights or clues,** analogous to detective work. It is these insights or clues that are the most important part of the abductive process. The **three-step abductive process** is shown in Diagram 2 below. The second and third step are critical for theory development, thus the **focus in this study** is on the last two steps.

Diagram 2: The Three-Step Abductive Process



Step 1: Abductive Notes and Data – an overview of the quasi-experimental study (lay accounts) is covered in Chapter 4 with access to the extensive notes and data on the CD disk and a specially created site on google.

Step 2: Scientific Account – the literature review based on the abductive process is incorporated in Chapter 2, Part B. The literature in Part A provides additional context.

Step 3: Potential Clues – In Chapter 4, abductive 'clues' help in the development of two mechanisms (micro-level and disruption) of the process theory. In Chapter 5, the micro-level and disruption mechanisms are linked with the macro mechanism that outlines the process of how a crisis unfolds in 4-steps.

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Next, we discuss content and thematic analysis noting how these **two research methods are compatible with the Abductive RS**. Specific use of these methods can be found in Chapter 4 under the quasi-experimental study.

Research Methods: Content & Thematic Analysis

According to Grbich (2007: 109), **content analysis** is one the four main methods in the analysis of documentation. The others being conversational analysis, narrative analysis and discourse analysis. She states that these methods focus on using natural conversation to track how events (social, cultural and political) in combination with understanding (individuals and/or groups) shapes oral and written communication.

Collins and Hussey (2003: 255) describe content analysis (CA) as normally being associated with the positivistic approach and is a structured approach to analysing qualitative data. Grbich (2007: 112) define content analysis as systematic coding and categorization that is conducted in an unobtrusive way for the purpose of finding trends and patterns, relationships and discourses of communication. Krippendorf (2004: xiii and 17) states that content analysis is rooted in literary theory. Weber (1990: 10) states that when compared to interviews, content analysis has the positive attribute of being an **unobtrusive measurement**, thus no impact on the subject in terms of their answer. Bauer and Gaskell (2007: 147) summarize the strengths of content analysis (CA) as: systematic nature; public availability of data; raw data is naturally occurring; ability to deal with lots of data; can use historical data; unobtrusive method; inexpensive and well-established procedures.

On the negative side, according to Weber (1990: 15), the **main problem with content analysis is the data-reduction process** which results a few categories that originated from numerous words. Are these categories consistent or reliable? If there is ambiguity in the meanings or words, coding rules or the definitions of categories, then this can be an issue. The much bigger problem concerns validity arising from the degree to how reliably does the variable measure the construct that is intended to be measured. However, Collins and Hussey (2003: 257) note that clearly defined procedures mitigate concerns for reliability and validity. Another complication noted by Bauer and Gaskell (2007: 147-148) is: *'The moment at which something was said may be more important than what was said.'*

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To mitigate some of the negative, content analysis (CA) in this study falls under the **iterative and enumerative approaches** from the broad research approaches (methodologies) with **thematic analysis** as the main data analysis method.

In content analysis, the **level of importance is assumed to come from repetition** (thus, the fit with the enumerative approach) according to Grbich (2007: 24 and 114). The enumerative approach involves the classification of items (verbal, written or visual) numerically (rank order, frequency, percentages, key words in a specific context, counting incidences, etc.) or in whatever form is most applicable to the research question at hand. **Validity comes from the ability to replicate** the results by following the procedures laid out.

In addition, the purpose of the using content analysis is to provide an interpretation, thus the fit with the iterative (hermeneutic) approach. The **iterative inquiry (hermeneutic) is compatible** with research designs such as Grounded Theory and the **Abductive RS** by extension. **This form of inquiry seeks to develop meaning.**

According to Grbich (2007: 122) content analysis if used alone has some disadvantages – too positivist, interpretations that lack detail, information that is decontextualised and atheoretical since numbers do not tell the whole story. However, most of these disadvantages can be reduced by combining content analysis (CA) with a qualitative approach such as **thematic analysis**. And this allows for a deeper understanding leading to a more complete picture.

In addition, Grbich (2007: 16 and 32), notes that thematic analysis is idiosyncratic and can focus on repeated words or phrases or previous relevant research. Themes can arise from your gut feelings, evidence from area being studied, or from those observed or interviewed. This is in-line with Boyatzis (1998: vi – vii) who describes thematic analysis as encoding qualitative information. Themes are patterns in the information and can come about inductively or deductively from prior theory or research.

Finally, Althaus, Edy and Phalen (2001: 707-721) conducted a study which examined this issue and concluded that proxies, in this case headlines, can be used instead of the full text with high enough validity.

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Case Studies (Retroductive RS)

Research Method Employed: process tracing (theory development and theory testing). The theory-building process-tracing method is utilized as a **practical way to operationalize the Retroductive RS.** It was used here as a heuristic framework for theory-building. The theory-testing version is appropriate for testing a process within-case.

The use of process tracing is both in **theory building** and in **theory testing**. This is compatible with our goal of creating a process theory and to test such a theory. For example, the methodology of process tracing is useful for **finding and testing causal mechanism**, is used in political science, comparative politics, organizational studies, international relations, microbiology (tracing the causal mechanisms behind diseases), cognitive science and decision research studies for example.

Bennet and Checkel (2015: 4-5) states that the modern origins of process tracing are from cognitive psychology in the late 1960s or early 1970s, however it has been around in related forms going back to the Greek historian Thucydides. *'As used in psychology, process tracing refers to techniques for examining the intermediate steps of cognitive mental processes to understand better the heuristics through which humans make decisions.'* Thus, there is a **strong historical and time element**.

In addition, Yin (2009:9) states the use of case studies is a good fit for how and why questions. Explanation is the focus of this study, thus **why question have a time element** to trace operational links and this contrasts to methods focusing on frequencies. Tracing operational links over time is crucial in case study research. This is further emphasized by David de Vaus (2001:227) who states that the **importance of the time dimension** in most case studies and all explanatory case studies. The time dimension allows for the mapping of event sequence and this provides the basis of causal explanations. The **mapping of the sequence of events** is otherwise known as **process-tracing**, the term used by George and Bennett (2005). According to David de Vaus (2001:227-228), mapping the sequence of events (or process-tracing) needs to be provide a clear and detailed look at both the sequence and context of events. To be a convincing causal explanation, **we must be able to follow the 'story'** of how some event(s) produced a specific outcome.

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Theory-Building Process Tracing

However, process-tracing as discussed in George and Bennet (2005) and Gerring (2007) is seen as a single method that fails to showcase the different applications of the method. Beach and Pedersen (2013: 10-11) state, *'The result of treating process-tracing as one method is a set of murky methodological guidelines, along with confused students and practitioners.'* Thus, Beach and Pedersen (2013: 11) have proposed three distinct variations of process-tracing to accommodate three distinct research purposes shown below:

1. Theory testing
2. Theory building
3. Specific case explanation

The first two purposes (theory testing and building) are considered theory-centric variations while the last purpose (specific case on historical outcome) is considered a case-centric variation. The case-centric process-tracing variant (also called explaining-outcome process-tracing) is seen *'as an iterative strategy most closely resembles abduction, which is a dialectic combination of deduction and induction (Peirce 1995) ...'* Beach and Pedersen (2013: 19)

Bennet and Checkel (2015: 18) concur with the **notion of abduction and process-tracing**. They state, *'This often involves analyzing events backward through time from the outcome of interest to potential antecedent causes, much as a homicide detective might start by trying to piece together the last few hours or days in the life of a victim.'*

In the three variations, causality is not seen as patterns of regular association (neo-Humean) but as a deeper connection between cause and effect (mechanism). Beach and Pedersen (2013: 23-24) state, that the **case-centric analysis combines systematic and non-systematic parts** whereas the **theory-centric version focuses on the systematic parts, or simple causal mechanisms**. The reason for this is that the theory-centric version aims to generalize beyond a single case. Although the framework of three variations of process-tracing provided by Beach and Pedersen (2013) is useful, there are several issues which make it unworkable for our purposes.

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The retroductive approach is clearly seen in the explaining-outcome process-tracing variant, third version stated above, in which Beach and Pedersen (2013: 19) state the synergies with abductive logic as put forth by Peirce (1995). Abductive as defined by Peirce also incorporate retroductive logic, thus **the most appropriate philosophical approach towards theory-building** is cast-off by Beach and Pedersen (2013) from the theory-building process-tracing variation, second version stated above.

By simplifying the causal mechanisms in the theory-centric version, Beach and Pederson (2013) undermined the philosophical basis for the definition of causal mechanisms by taking out complexity and going towards reductionism.

Even Beach and Pederson (2013: 156-157) acknowledge **that this distinction between the two theory-building types is somewhat arbitrary**. They state, *'Therefore, we should not draw the line between explaining-outcome and theory-building process-tracing too sharply. The difference between them is more a matter of degree than a difference in kind, and explaining-outcome process-tracing case studies often point to specific systematic mechanisms in principle can be tested in a wider population of cases or act as building blocks for future attempts to create generalizable causal mechanisms that can explain outcomes across the population of relevant cases.'*

Our position is that **the explaining-outcome process-tracing variant** which relies on **abductive/retroductive logic** is needed first to create a theory of causal mechanisms, **then to modify some elements to generalize** to a wider population of cases.

Thus, our definition of distinct variations on process-tracing only has **two – theory testing and theory building**. For our purposes, the modified version of the theory-building process-tracing variation which incorporates the eclectic and broader definition of causality found in the explaining-outcome process-tracing is adopted by this research study. Felleti and Mahoney in Mahoney and Thelen (2015: 229-231) agree on the two logics of process tracing – theory building and theory testing.

In other words, the second variation (theory-building) is combined with the third variation (explaining outcomes) under the Beach and Pedersen (2013) framework to **produce a more viable process-tracing method** closer to the Retroductive Research Strategy (RS). Note that the modified version of the theory-building process-tracing

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variant will be used as **a process tracing heuristic framework** to carry out the Retroductive Research Strategy (RS) as shown in Figure 1, page 76. This is way to get around the issues of **reductionism** and **generalizability**. Regarding the issue of generalizability, it should be noted that **single case studies** or a **few case studies** have been used creating some of the most important theories in social science.

Gerring (2007:39-40) provides several examples of **path-breaking research** that was accomplished with **just a few key cases**. He states that insights regarding human evolution came to Darwin after he traveled to a few locations, most notably Easter Island. Freud constructed his theory from only a few clinical observations numbering less than a dozen. The neoinstitutionalist theory of economic development of Douglas North was developed by only looking at a few early developing states – England, the Netherlands and the United States. George and Bennet (2005:114-115) also mention Charles Darwin. They state that his theory of evolution was sparked by only few cases regarding the tiny differences between finches from the Galapagos Islands and the South American mainland. Bennet and Checkel (2015: 13-14) also cite Charles Darwin's theory of evolution. In short, process tracing may uncover mechanisms that can be very case specific or general, but it is difficult to know prior research on the case. They acknowledge that because process-tracing is a within-case method of analysis, then it may be problematic or difficult to generalize.

Further support is provided by Felleti and Mahoney in Mahoney and Thelen (2015: 212-213) who state that process tracing is very valuable in **analyzing individual events (political or economic)** and at the same time **since events have general characteristics that are similar**, it is possible to conduct cross-case studies. In their notation, the term 'occurrence' denotes a happening to a single unique case – Great Depression or assassination of Martin Luther King Jr, World War I. However, if recast at a more general level or analysis – depression, war, and assassination, this can be more general instead of just an 'event' by their definition.

Next, we will discuss a modified version of the theory-building process-tracing variation that **we employed in this study**. The discussion will also address the issue of reductionism. To accomplish this, first a brief overview of the two types of theory building research situations will be discussed, then the modification made to the three process tracing steps in building a theory.

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Beach and Pederson (2013:16) discuss two types of research situations in which theory-building process-tracing can be employed. First, we don't know the potential mechanism that links the correlation between X and Y. This is called X-Y-centric theory building. Second, the outcome (Y) is known, but the cause (X) is unknown. This is called Y-centric theory building. In the second instance, the analysis first traces backward from Y to uncover a plausible X, turning the study into an X-Y-centric analysis. The approach taken by this study is more in line with the second research situation, **Y-centric theory building**. We are searching for plausible X's.

The Retroductive (RS) now has a **framework** that can be used as a **heuristic** guide on putting together the puzzle regarding the causal mechanism (X) that results in a crisis outcome (Y). This is the theory-building part of the Retroductive (RS) using the framework of theory-building process-tracing. In short, this addresses the research question: **Why do Crises Happen?**

It should be noted that the Retroductive (RS) is a **mental thought process akin to detective work or puzzle solving**. The theory-building process tracing as used in this study is a heuristic framework to facilitate this mental thought process to creating a theory. In short, both the Retroductive (RS) and the modified version of the theory-building process-tracing are looking for a **causal mechanism** that produces Y, in this case a financial crisis.

In short, **tracing the process mentally** using the 2007-2008 Credit Crunch as the base case, allowed us a relevant framework to develop the **causal mechanism - the 4-step process model of financial crises**. Note that this was done in tandem with the abductive process regarding the actor model. This was designed for the modern era of finance which includes hedge funds as key actors.

The danger in this case is that the causal mechanism will be to case specific and not generalizable to other financial crises. Thus, a fine line had to be walked between providing enough complexity and context versus some less complexity in some form of reductionism in order to generalize to other financial crises. To allow for generalization for example, the 4-step model of financial crises was adapted in the first step to fit the key actors in several financial crises. To test the generalizability of our model, the theory-testing process tracing method will be discussed next.

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Theory-Testing Process Tracing Method

For our purposes, process-tracing is an ideal way to test the generalization of the 4-step Process Model of Financial Crises on additional financial case studies. Earlier we had noted that **the model was developed from the 2007-08 Credit Crunch**. In short, a crisis model for the modern era of finance. Modifying parts of the causal mechanism, 4-step Process Model of Financial Crises, would allow us to understand and explain crises outside of the modern era of finance.

The theory-testing process method relies on **legal-evidence** for proof. Beach and Pederson (2013:99) emphasize the term **'relevant'** evidence to the evidence law. Citing U.S. Federal Rule of Evidence 401, they state the definition of relevant evidence as: *'any evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable that it would be without evidence.'*

This is essentially Bayesian logic. In the context of within-case and cross-case studies, Beach and Pederson (2016:171) state, that we use Bayesian logic as a tool to access empirical evidence and **how it increases or decreases our confidence** in that theory. As new evidence is collected, we update our confidence, this is known as 'posterior probability.'

Process tracing and Bayesian logic have lots of points in common. Bennet and Checkel (2015: 16-17) state, *'Central to Bayesianism and process tracing is the idea that some pieces of evidence provide higher inferential powers than others.'* They then discuss the framework of the probative value of evidence proposed by Van Evera (1997). The **two criteria here are the uniqueness and certainty** of the evidence. This results in four test combinations shown below. Note that the source here is Bennet and Checkel (2015: 16-17) based on Van Evera (1997), except where noted.

1. **Hoop Test:** this is certain but <u>not</u> unique. Failing this test disqualifies the explanation but passing the test produces weak confidence in the explanation. However, Mahoney (2012:575-576) states that the frequency in nature of passing a hoop test constitutes strong evidence in favour of hypothesis.

   <u>Example:</u> *'Was the accused in the state on the day of the murder?'* If he was, then certain but this is not unique since 100 other suspects were also there.

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2. **Smoking-Gun Test:** this is unique but not certain. Passing this test strongly supports the explanation but failing it might have no meaning regarding confidence in the explanation. Again, Mahoney (2012:578) notes that the strength of the smoking-gun test again depends on frequency of occurrence.

   Example: *'In Van Evera's example, a smoking gun in a suspect's hands right after a murder strongly implicates that suspect, but the absence of such a smoking gun does not exonerate this suspect because murders have incentives to hide smoking-gun evidence.'*

3. **Doubly Decisive Tests:** this is both unique and certain. The result is a high degree of confidence in the explanation. In the social sciences, this is **rare**.

   Example: *'Van Evera uses the example of a bank camera that catches the face of bank robbers, thereby strongly implicating the guilty and exonerating the innocent.'*

4. **Straw in the Wind Tests:** this evidence that is not unique or certain. It is circumstantial evidence.

Finally, Mahoney (2012: 584) notes that just passing one test is not decisive but passing a number or series of such tests increases the confidence in that explanation while decreasing the confidence in other explanations.

Since **set-theoretic analysis** lies at the **heart of studying mechanisms**, we need to look at these intervening events in a different way from variable-oriented analysis. Mahoney (2016: 495) states that process-tracing tests such as the hoop and smoking gun tests are based on set-theoretic analysis. Thus, passing the Hoop test is a necessary condition for a given explanation while passing the Smoking-Gun test is seen as sufficiently confirming a given explanation.

Beach and Pederson (2013:68-74) note that **process-tracing methods are making within-case inferences** to determine if the evidence of a specific case can be used to infer that the hypothesized causal mechanism was present in the case. In short, due to the very case-specific nature of the observable implications from mechanisms, evidence may vary between cases. In short, analysis can only be done on a single-case, and then comparative methods are used to make cross-case inferences.

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In short, the Bayesian logic of inference is used within-case. Beach and Pederson (2013:68-75) stress that, *'inference in process-tracing is more analogous to a court trial, where the researcher assess the degree of confidence in the existence of a causal mechanism linking X with Y based on many different forms of evidence .... having one form of evidence may be enough.'* This goes back to term **'relevant' evidence** as defined in evidence law, that was discussed on earlier.

This leads us naturally to **how we should view evidence**. It can be done using the mathematical logic of process tracing – Bayesian analysis, or in a more intuitive way. The mathematical way is discussed in Bennet and Checkel (2015: 276-298) and Beach and Pederson (2013:83-88 and 96-99). In this study, **we will employ the more intuitive way** that resembles how a court room proceeds on deciding a case.

Mahoney (2016: 496) points out that one of the problems of Bayesianism is the focus on the degrees of belief held by researchers. Thus, due to this problem Bayesianism is used sometimes as a metaphor for process tracing rather than in a more formal mathematical form. In their more recent work, Beach and Pederson (2016:154) **strongly suggest the more informal intuitive approach**. They state, *'In our view, the informal use of Bayesian logic enables scholars to focus on what matters most in case studies – learning about how a causal relationship works (or does not work) by understanding what particular pieces of empirical material mean in the context of a particular case, or what an invariant distribution of cases means within a bounded population.'*

Furthermore, Mahoney (2016: 495-497) states that it is now widely accepted that **Bayesianism is better suited for the logic of process tracing** than frequentism. First, it overcomes the small-N problem partially by using a large number of within-case observations but also because it is rooted in set theory and logic. *'Recognizing the set-theoretic foundations of Bayesian helps elucidate the logical mechanics through which particular pieces of evidence lead to belief updating with process-tracing. A given piece of evidence can shift beliefs about the validity (or non-validity) of a proposition only when this evidence is used in conjunction with a generalization.'* Finally, the power to update beliefs is based on the **extent of necessary and sufficient conditions** in the generalisations.

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Next, we need to discuss the types of evidence in process-tracing that we are testing. Beach and Pederson (2013:99) discuss four types – pattern, sequence, trace and account. For our purposes, we are mostly interested in **sequence type evidence**. In other words, the '...temporal and special chronology of events predicted by the hypothesized causal mechanism. Also, trace and account evidence are relevant. Trace evidence is proof that something existed, and account evidence deals with the content of that evidence. Below I will provide an overview of how the type of evidence can be measured in the cross-case studies.

Pattern evidence is based on **statistical evidence** of some part of the mechanism. It should be noted that relevant mechanistic evidence can even be quantitative or statistical evidence according to Beach and Pederson (2016:166). This apply for example to the quasi-experimental study conducted under the Abductive RS.

Sequence Type Evidence: can the causal model be used to **explain temporal processes** of a crisis. In other words, how good of a fit is it to each crisis. Supporting the sequence is the quasi-experimental studies which show that Social should be given more weight as a causal factor than psychological (discussed in the next section). For this to be accepted, we need to ask was it logical and reasonable that the sequence of this process could have happened in this way.

Trace Type Evidence: is simply **did something exist**. In the case here, the focus is probably on trigger part of the model. Was the trigger social or political? In short, is there evidence in the case that the crisis was triggered due to political or social reasons.

Account Type Evidence: the focus here is on the **context of the evidence** or **details** regarding the steps of the 4-step process-oriented theory of crises. For example, how did a political or social event (Step 2 Trigger) unfold depending on the actors (from Step 1: Social) and how were they disrupted have (Step 3: Disruption).

It should be noted that while we are looking to find a case-specific causal mechanism, we are also creating a causal mechanism with an eye towards explaining other financial crises. Thus, the systematic parts designed to be applicable to all crises can be confirmed under process-tracing methods.

Beach and Pederson (2016:165) discuss when the **evidence is more broad-based and coherent, this usually means evidence of a 'smoking gun' type.** In our case, the

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quasi-experiment conducted under the Abductive RS provides many 'smoking gun' type evidence since the **statements from the students are essentially observations called 'confessionals.'** The 'confessionals' are then analysed using statistical and content/thematic evidence which results in greater confidence in parts of the causal mechanism. Thus, the Abductive RS provides us with stronger confidence in the **micro-level processes and the macro to micro disruption mechanism** within The STDP Theory of Financial Crises.

Another aspect of using this approach specifically in creating a theory or framework to generalize to various crises, is the idea that under Bayesian logic the new evidence needs to **increase our confidence versus the old evidence**. This has more to do with increasing our degree of confidence versus prior explanations. In this case, prior explanations mean a general framework or theory of financial crises.

An Example of Process-Tracing Tests from Case Study 1 on pages 142-143

The temporal processes of the Credit Crunch/Euro Crisis Period can be explained by the STDP Theory of Financial Crises. The evidence here passes the **Smoking-Gun Test** since this is a unique explanation but not certain.

Sequence Type of evidence is provided regarding the 4-step Macro Mechanism (Social, Trigger, Disruption and Psychological), Macro to Micro Disruption Mechanism and the Micro Mechanism. **Account Type Evidence** is also present since The STDP Theory provides a logically consistent explanation of how the crisis unfolds through all three mechanisms.

Trace evidence is present especially in Step 2: Trigger since this crisis period is very broad and covers **all five trigger mechanisms** in the STDP Theory. The most critical trigger is the Macro-Policy Environment (MPE) since this results in uncertainty. In this crisis, there were **four key MPE trigger events** with some being very severe such as when the US Government let Lehman collapse.

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Part III: Implementation of the Retroductive RS

Theory creation involved the use of a **heuristic framework** from the modified theory-building process tracing method. The process shown below in Figure 1 below provides a mental framework that enables us to develop the theory.

Figure 1: Process-Tracing Heuristic Framework for Theory Building

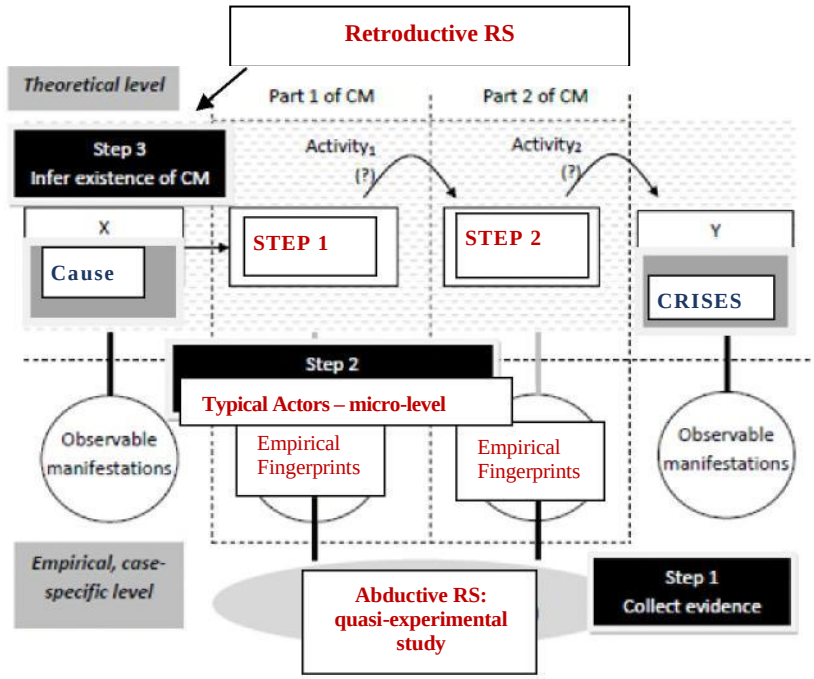

Figure 2 – Theory-building PT.

Note (bold lines = primary inferences, shaded lines = secondary inferences, area with shaded lines = what is being traced)

Source: Adapted from Fig. 2.3. Theory-building process-tracing, Beach and Pedersen (2013: 17) and Beach and Pedersen (2016: 316). First, in Step 1, the Abductive RS provides clues that are used in Step 2 to develop the micro-level mechanism. Then in Step 3, a causal mechanism (CM) is developed using the Retroductive RS.

The importance of using a **heuristic framework** comes down to the difficulty in articulating clear guidelines in theory development. This is due to the creative or instinctive aspect of this activity. In short, the framework above resembles the way a detective would solve a case, this is similar to the abductive logic of Pierce.

The retroductive logic according to Blaikie (2007:102) is used to search for **explanatory mechanisms of which social actors are unaware**. Thus, the Retroductive RS is focused on the **'structures and mechanisms'** that explain regularities and these mechanisms can thought of as building blocks and this has important implications as discussed in the next paragraph.

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Beach and Pederson (2016: 91) take a retroductive approach when they state that, *'When theorizing about mechanisms in the systems understanding, we are not necessarily reinventing the wheel each time. Instead, we can think of mechanisms in building-block terms, with certain elements that are common to similar types of causal explanations (Steel 2008: 49—53). This can also be termed "modularity," where certain parts of a causal mechanism are "modules" that can travel across classes of theories.'*

Next, the discussion here will proceed with a broad overview of the implementation process. As discussed at the end of the theory building section in this chapter, we discussed how we mentally traced the process of how a crisis unfolds using the **20072008 Credit Crunch as the base case**.

The development of the **macro mechanism** that is represented by the **4-step process model of financial crises** was done in tandem with the abductive process regarding the **micro-level mechanism** and **macro to micro disruption mechanism**. Since the base case was the 2007-2008 Credit Crunch, our focus would be the modern era of finance, which includes hedge funds as key actors.

The danger in this case is that the **causal mechanism will be too case specific** and **not generalizable** to other financial crises. Thus, there is a fine line that needs to be walked between providing enough complexity and context versus less complexity in some form of reductionism in order to generalize to other financial crises.

Towards the Development of the Macro Mechanism and Connection between the Three Mechanisms: The use of Counterfactuals and Thought Experiments

The Retroductive Research Strategy (RS) was a bit vague in terms of practical implementation, thus the method of process-tracing was examined to fill in this gap. This resulted in the **process-tracing heuristic framework** on the previous page.

However, we now need to add thought experiments and counterfactuals to this framework. As mentioned earlier in this chapter, Rolan Paulson in Swedberg (2014) point out that the use of **counterfactuals can play an important role in the creative process of theorizing**. Meyer and Lunnay (2013: 3) also emphasize counterfactual thinking and thought experiments especially where controlled experiments cannot be conducted. Roese and Morrison (2009: 16-17) offer the following definition:

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'Counterfactual thinking refers to mental constructions of alternatives to past events ...What might your life be like if you had made key choices differently? ...These sorts of thoughts are termed counterfactual, meaning they are mental representations of alternatives to past factual events.' In addition, counterfactuals can entertain outcomes that are both better and worst versus actual results.

In economics, Kahneman and Tversky (1982) studied **psychological and behavioural outcomes** using counterfactual thinking. Additionally, Friedman and Schwartz (1963) used **counterfactual thinking in their hypothesis on the Great Depression**. In short, they asked whether a different approach on monetary policy at the time would have resulted in a moderate crisis rather than the severe crisis experienced during the Great Depression. Hsu (2013: 21) states that studies by Calomiris and Mason (2003) later showed that a more expansionary monetary policy as proposed by Friedman and Schwartz would not have altered the outcome.

In contrast, Christiano et. al (2004: 43-44) construct a simulation of the Great Depression and their model shows a substantial reduction improvement in moderating the outcome by implementation of the counterfactual rule. Output fell only 6% versus the 26% fall in output in the baseline simulation. Thus, they find support for the Friedman and Swartz (1963) counterfactual hypothesis. The point here is that counterfactuals were used in theory development and later on to test the theory.

Thought experiments, a complementary approach, have a long history in the natural sciences beginning in the Greek period and used as a systematic method in the 19th century, but lost favour in 20th century, except for Thomas Kuhn's and Karl Popper's work, only to re-emerge in the mid 1980's according to Moue et. al (2006: 61-62). They define thought experiments as *'...a methodological process of scientific reasoning (hypothetical or counterfactual), which carried out within the context of an imaginary scenario and lead us to new knowledge about the natural world.'*

Sorensen (1991: 250) asks the question, *'Does the experimental method exclude thought experiments?* The Austrian philosopher and physicist, Ernst Mach did not think they were different. Mach developed the first detailed theory of thought experiments and came up with the term. Relativity theory and quantum mechanics are counter-intuitive and not based on everyday experience. Mach contributed to

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these fields but more importantly he laid the groundwork to justify thought experiments. This was later used by Einstein.

For example, Moue et. al (2006: 61-63) note the connection between Greek thinking regarding thought experiments and modern philosophy of mathematics in the case of Imre Lakatos. A commonly cited example is **Galileo's thought experiment** that refutes the Aristotelian view that heavy bodies fall faster than light ones.

In reference to thought experiments and theory development, Moue (2006: 66) cites both Thomas Kuhn (1964) and Karl Popper (1934). Both sought to explain creativity in scientific discovery and how theories change. For Popper, thought experiments are referred to as critical and heuristic. Critical thought experiments show why some assumption or way of thinking is wrong. Heuristic thought experiments correct ways of thinking. For Kuhn, it was more about theory change. An anomaly in the old framework results in a crisis, looking at the old data in a new way the thought experiment results in a new 'paradigm.'

In developing the STDP Theory of Financial Crisis numerous thought experiments along with counterfactual thinking were conducted over several years. Some of these thought experiments are were written down and some were just thoughts. In the opinion of the author, it would be impossible to create theory without the use of these two methods in some way.

Examples of how thought experiments and counterfactual thinking were used to develop the STDP Theory of Financial Crisis can be accessed on the CD disk or through the following link: https://sites.google.com/view/stdp-theory/4-retroductive-appendix-i-counter-factual-and-thought-experiment-notes These notes are termed Retroductive Notes and cover theory development, role of politics, micro-level mechanism thoughts and quantitative/crowded trades and theory development thoughts. Additional notes will be scanned and added in the future.

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Chapter 4: 'Insights' towards a Crisis Theory

Abstract

The Abductive Research Strategy is designed to provide insights or clues for the development of a process-oriented theory of financial crises. Several key assumptions relevant to a crisis theory were explored: the rationality of agents; macro or micro explanations; the relative importance of social and psychological factors; and the incorporation of political factors into trading decisions. The results of the study led to a potential micro-level mechanism and a macro to micro disruption mechanism for a process theory of financial crisis.

Key Words: Abductive, Financial Crisis, Process Theory, Mechanisms

This chapter is divided into three sections. In Part I, we provide an overview of the abductive process. In Part II, we discuss the key findings and main insights of the study and how they contributed towards a process theory of financial crises. In Part III, covers model modifications and 'fit' between the mechanisms.

It is important to stress that what is critical for theory development is not the full details of the abductive study and process but the actual outcome or path that led to **insights or clues** that could eventually be useful in the final development of theory of financial crises. The abductive study by its very nature is large thus providing the full study would disrupt the coherence and flow of the argument. Our goal was not to minimize the importance of the abductive study but to prioritize coherence and the theory building.

Thus, this chapter is kept concise on purpose. An initial overview of the abductive research methodology and the quasi-experimental study were presented in Chapter 3: Research and Methodology (pages 62-65). Further details of the quasi-experimental study can be found in Appendixes under Abductive Notes I and II. These appendices and comprehensive guidelines regarding the study, access to the data, and the complete results of the study are on the **CD disk** provided with the hard copies of the thesis and on Google at: https://sites.google.com/view/stdp-theory

Note: A more complete listing of the resources is provided at the end of this chapter.

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Part I: Overview of the Abductive Process and Key Insights

The abductive study looks at financial crises from the point of view of a trader in the financial markets. Therefore, a framework that shows the process of how a trader thinks and makes decisions will be useful in a discussion of how various financial discourses or 'ways of thinking' are operating in the market.

- **Abductive Process and the Quasi – Experimental Study**

The quasi-experimental study of three cohorts (2010 to 2012) of postgraduate students (MSc Global Banking and Finance Programme at the European Business School – London, Regent's College) engaged in a virtual trading study provides the data for the survey, content and thematic analysis. The students undertook a two-month trading simulation exercise in real-time using a virtual trading account with a broker of their choice. In total, there were 36 cases over the three years. All the students took part in the survey but for the content/thematic analysis a sample of 20 cases were selected and analysed out of the 36 total cases.

It should be stressed that the quasi-experimental study was **not a controlled experiment** typical of most behavioural finance or economic studies. An artificial environment was not created. Under the Abductive RS, the quasi-experimental study could not be a controlled type experiment since that would defeat the essence of the methodology. The quasi-experimental study was an **open type experiment** which matches the research strategy and methodology employed.

It is important to note that some of the students had prior experience trading in the financial markets. In the study there is an assumption here that the trading experience and decisions of the post-graduate students would represent professional traders in the financial market. This approach is also commonly done in behavioural finance studies.

The abductive process, specifically the relevant literature in Chapter 2 relied on the background of the researcher. This resulting literature was part of the abductive process of going from 'lay' to 'scientific' accounts. The goal is to develop an understanding of market actors. In short, the Abductive RS is used to develop the

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'typical agent' in the **micro-level mechanism**. In this process, the role of the researcher is important. In order to mitigate some of the differences and thus produce a closer representation of the views of traders in the financial markets, the judgement and extensive trading experience in the financial markets of the researcher was important in the whole process.

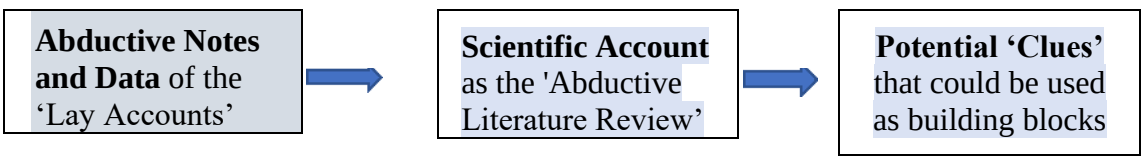
The three main questions for the abductive study are shown below:

1. Why do traders hold certain views of the markets?
2. What is the role played by psychology, reflexivity and financial models?
3. How are politics and political constraints faced by governments accounted for by traders?

We will briefly summarize the results of the three questions above, then provide a summary of the relevant literature from Chapter 2: Part B. The relevant literature, termed abductive literature here, will then be used to help build a process-oriented theory of financial crises. The references to literature are part of the iterative nature of the theory-building methodologies that required an extensive use of combining evidence with references to scientific literature.

The result of the abductive process then leads to potential **insights or clues** that might be useful as potential building blocks for a financial crisis theory. 'Clues' in this case are analogous to what a detective might find in a murder mystery. In short, the logic of abductive is very similar to the underlying logic utilized by a detective. The **abductive process** is shown in Diagram 2 (from page 63) below:

Diagram 2: The Three-Step Abductive Process



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- **Link between Key Insights or Clues and Crisis Theory Issues**

The potential insights or clues that arise from the abductive process cover several key issues for the development of financial crisis theory that were first discussed in **Chapter 2 (Part A, page 27)**. They are as follows:

Crisis Theory Issue: Revisit the Rationality Assumption of Agents
Source: Q1: Why do traders hold certain views of the market?
Support both from the abductive notes/data and abductive literature review point to issues with the prevailing rational expectations view of agents in finance. The abductive process led to the possibility of a framework which consists of **heterogenous agents and 'multiple equilibria'** under the assumption that there is not an undisputed fundamental equilibrium model as a possible starting point.

Potential Clue 1: This led to a search for an 'acceptable' alternative model. A perfect model did not exist thus the goal was to find an **'acceptable' model** and to modify the model if needed. The DBO-model or DBO Theory developed by Hedström (2005) seemed like a possible candidate, however modifications to the model were required in order to adapt it to finance. In addition, this model borrowed from analytical sociology was 'reductionist' in nature, thus further modifications or assumptions would be needed to incorporate macro-level aspects. In short, a **macro to micro disruption model** would need to be closely linked or 'fit' with the modified DBO-model to mitigate or overcome the 'reductionist' assumptions.

Crisis Theory Issue: Macro or Micro Explanation (Agent-Structure Issue)
Source Q2: What is the role played by psychology, reflexivity and financial models?
A possible macro-micro disruption model was identified as a potential 'fit' based on the abductive notes/data and subsequent abductive literature review. This was based on content/thematic analysis of categorizing biases as psychological or social and consistency regarding the use of technical indicators.

Potential Clue 2: The academic study by Hirshleifer and Teoh (2003) that was further supported by Schulmeister (2006) provides a good 'fit' with all the evidence from the abductive study. In short, their nuanced explanation of how psychological/social (herding, cascading and clustering) provide the basis for a macro to micro disruption model.

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Crisis Theory Issue: Sequence and Importance of Sociological and Psychological Factors

Source Q2: What is the role played by psychology, reflexivity and financial models?

The combined evidence from this question suggested that social factors are as important as psychological. In conjunction with the insights from the potential macro to micro disruption model discussed in the previous section, we need to consider the right sequence of sociological and psychological factors. In general, do sociological or psychological come before the macro to micro disruption model?

Potential Clue 3: Further thought on the sequence of steps in the macro mechanism.

Crisis Theory Issue: Incorporate Context - Political Factors

Source Q3: How are politics and political constraints faced by governments accounted for by traders?

The abductive notes/data were limited for this question. All that can be concluded based on the notes and data is that agents display 'bounded' rationality when it comes to politics and geopolitical analysis. Politics is thus strategy or industry specific.

The researcher had a strong bias based on years of trading experience that politics plays a crucial role in financial crises. Thus, the abductive literature for this question was driven more by the views of the researcher. Part of the issue here is that politics is difficult for market actors in general, thus additional insight by the researcher was required here.

Potential Clue 4: The analysis lead to a split of political factors into two frameworks: known/somewhat predictable or know or unknown/difficult to predict. These frameworks are best described as 'confidence' or 'uncertainty' respectively.

In Part II, we provide the key findings and insights from the quasi-experimental study. This is a more comprehensive and detailed view of the summary of the key 'insights' or 'clues' presented here.

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Part II: Key Insights or Clues from the Abductive Process

Q1: Why do traders hold certain views of the markets?

The purpose of this question is to gauge the beliefs (attitudes) towards the main discourse in finance – the Efficient Market Hypothesis (EMH).

For our purposes, the discourse we are interested in is the 'finance' discourse, which is manifested in the Efficient Market Hypothesis (EMH). In short, **traders choose trading strategies based on their belief of EMH**. Thus, it is important to test belief in the EMH, which is the focus of the first question. To address this question, three additional delineating questions were asked, shown below.

Does exposure to the EMH through prior financial education shape trader views?	Does exposure to trading experience affect how one views the EMH?	How is the EMH viewed?
Data: MSc Trading Class Surveys 2010-2012, N=54	Data: MSc Trading Class Surveys 2010-2012, N=54	Data: MSc Trading Class presentations (20 cases)
Test: Independent Groups (Between Groups)	Test: Repeated Measures (Within Subjects)	Method: Content/Thematic Analysis of cases with focus on EMH views

Summary of Results:

Does exposure to the Efficient Market Hypothesis (EMH) through prior financial education shape student views? Purpose: to gauge the degree of exposure and consequently belief of the EMH by students who have had prior financial education.

A dichotomous independent variable was created by splitting the group into those with past finance exposure (coded #9 multiple ans) or those with very recent exposure to finance (coded #1 MSc Finance). The dependent variable measures the relevance of the EMH in trading. A five-point Likert scale (Very Relevant, Relevant, Average Relevance, Somewhat Relevant and Not Relevant) is used.

The Mann-Whitney showed that the MSc Fin group (coded #1) has a significantly higher mean rank (30.58) than the multiple ans group (coded #9) with a mean rank of (21.47). Significance is at the 0.5 level since $p = 0.025$. Thus, we reject H_0 that there is no significant difference between the means.

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Thus, the data suggests that students with recent exposure to financial education and the EMH (coded #1 MSc Finance) had a stronger belief in EMH than students with more experience/exposure in the real world (coded #9 multiple ans.). The likely reasons for varied belief in the EMH between the two groups are: work experience, criticism of the EMH in the financial media and behavioural finance knowledge.

Does exposure to trading experience affect how one views the EMH? Purpose: to see if belief in the EMH becomes stronger or weaker after being exposed to real-time trading experience.

The real-time trading simulation was carried out by three different classes over a 2-month period for the years 2010, 2011 and 2012 respectively. The repeated measures (within subjects) experimental design was employed using the Wilcoxon Signed Ranks Test. For the repeated measurement, the same questionnaire was used in the pre and post-test. Only students (cases) present in both time periods were used thus N=47 not 54.

The Wilcoxon Signed Ranks Test for the combined years 2010 to 2012 ($z = -3.888$, $p = 0.000$, $N = 47$) rejects H_0 that the means were not statistically significant at the 1% level.

For the 2010 to 2012 combined results, the Wilcoxon Signed Test shows that there were more negative ranks (29) than positive ranks (7). In short, students on the post-test ranked the importance of the EMH less on the Likert scale. The results of the combined years 2010 to 2012 clearly show that students found the EMH less relevant once they experienced real-time trading and a broader view of financial discourses.

For those students who had an initial belief (pre-test) that was relevant to very relevant regarding the EMH, might have realized through actual trading that fundamental trading strategies worked. Thus, they would go from a belief in the semi-strong to the weak EMH framework. Other students whose initial belief (pre-test) was somewhat relevant, for example, might have gone to not relevant, etc. This means they initially believed in the weak EMH framework and now they don't believe in the EMH. This might have been a result of success using technical trading strategies which means that past prices can be used to gain an edge in the market.

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In this question, we match up general trading strategies that are based on a belief in EMH to obtain additional insight. In brief, the three EMH versions are strong, semi-strong and weak. The strong form is close to the idea of perfectly competitive markets in economics, it is only a theoretical abstraction and does not exist. In the semi-strong form, only insider trading strategies have value while in the weak form past data has no value, but fundamental strategies have value in the short term. Technical trading strategies imply a non-belief in the EMH.

How is the EMH viewed? Purpose: to link general trading strategies (technical or fundamental) to a specific version of EMH.

A content/thematic analysis of 20 cases was conducted and there was a clear split between **weak form EMH** – fundamental strategies and **no-belief in EMH** – technical strategies. Some teams pursued both fundamental and technical strategies thus the results added up to 27. There were 16 teams pursuing fundamental strategies thus belief in weak EMH, 9 teams conducting technical strategies thus no-belief in EMH and 2 teams pursuing insider strategies thus semi-strong EMH.

Abductive Process Summary: analysis & connection/synthesis with literature Q1: 'Why do Traders hold certain views of the market?'

To conclude, we are left with the possibility of a **framework** which consists of **'multiple equilibria' and heterogeneos agents** under the assumption that there is not an **undisputed fundamental equilibrium model** as possible starting points in the development of an appropiate **'micro-level mechanism' for financial crises.** Both 'multiple equilibria' and heterogenous agents have been discussed in Chapter 2: Part B. Both the empirical study and finance literature provide support for this view. For a more detailed discussion, please **s**ee **Chapter 2: pages 26-35**.

Potential Insights or Clues: An agent model, borrowed from sociology, for possible inclusion as part of the Micro-Level Mechanism.

This section takes into consideration the limitations of actor behaviour models found in economics/finance with insights from the abductive study in the previous section. A plausible model of agent behaviour to incorporate into a more complete micro-level

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mechanism as part of a theory of financial crises is presented here. An agent model from sociology was found after a search conducted by the author.

To this end, we develop a modified version of the DBO-model or DBO Theory developed by Hedström (2005). An important aspect of the DBO-model is that **actors are assumed to be reasonable and intentional, but not necessarily rational.** Hedström (2005: 61) states that there is no assumption that the actors are rational in DBO theory. In addition, cognitive biases are considered important and that only under rare circumstances, such as *'sufficiently transparent environments'* is it possible for actors to act rationally. Thus, he does not see it as appropriate to use rational-choice explanation as the starting point of any discussion. Additionally, actors are seen as *'...not perfectly informed,'* in other words bounded rationality.

Desires (D), beliefs (B) and opportunities (0) are the basis of action and interaction according to Hedström (2005: 38-42). Action in this sense is seen as intentional action, not typical behaviour such as snoring, etc. '*...A belief can be defined as a proposition about the world held to be true ...and a desire as a wish or want. Opportunities, as the term is used here, describes the 'menu' of action alternatives available to the actor, ...independently of the actors' beliefs about them.'*

Beliefs and desires can motivate action whereas opportunities exist independently of the actors, but we assume the actors are aware of their existence. Finally, it should be noted that using the DBO theory does not allow one to predict actions since actor beliefs and desires are not always known at a particular time. Even if we know that specific beliefs and desires result in the actor doing X for example, the actor might also end up doing Y because these specific beliefs and desires are linked with Y in an even stronger sense.

Social interaction is considered a key component of DBO theory. Hedström (2005: 43-45) explains that **beliefs can be altered through actor interaction with other actors.** Beliefs are formed through mechanisms that are 'causal' not 'intentional' and these beliefs operate subconsciously. '*Dissonance reduction ...is an important example of a process in which the actions of some bring about dissonance and subsequent changes in the beliefs of others.'* The next two insights are especially relevant in the financial industry. Interactions not only occur between individuals but

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can also occur between individuals and a social aggregate. Actors might be aware of the actions of others without knowing them and this influences the action of these actors. This is also referred to as reflexivity in finance.

Finally, **individuals can behave similarly without social interaction**. To clarify, Hedström (2005: 45-46) provides examples of two effects where this could happen. The environmental effect is simple action due to the environment, rain for example. The selection effect could be based on chance or other reasons or processes.

In other words, the discussion here is on the sources of uniformity within a group of individual actors. It is noteworthy that in DBO Theory, **macro factors on their own cannot exert influence on the actors.** Actors can only be influenced through their own beliefs, desires and opportunities or through interaction with others that changes those beliefs, desires and opportunities.

Thus, one of the key problems with the DBO model is **reductionism.** Sawyer in Demeulenaere (2011: 79 and 84) is highly critical of the approach taken by Hedström and other social mechanists who adhere to the view that, '*there exist no such things as macro-level mechanisms.'*

However, this is no different than the current state of actor models in finance. What is odd is that under the environmental effect, institutional factors are not mentioned. This could imply a macro-level influence. The influence of macro-level mechanisms must be identified and incorporated in the DBO model or as separate mechanism to **bridges the gap between the macro and micro-level mechanisms**. The result would be a modified DBO model that approximates reality closer and accounts for both micro and macro-level mechanisms.

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Q2: What is the role played by psychology, reflexivity and financial models? Two key delineating questions were asked regarding the occurrence of psychological biases at the group level and the relative importance of psychological biases versus sociological factors. These two questions were critical in the development process of a theory of crises since the influence and sequence of psychological and sociological factors needed to be clarified. The two questions are shown below:

Do psychological biases occur at the group (social) level? Data: MSc Trading Class presentations (20 cases) Method: Content and thematic analysis of MSc Trading Class presentations (cases), focus on psychological aspects.	What are and how relevant are psychological biases and social beliefs during real-time trading? Data: MSc Trading Class presentations (20 cases) Method: Content and thematic analysis of MSc Trading Class presentations (cases), focus on reflexivity and financial models.

Summary of Results:

Do psychological biases occur at the group (social) level? Purpose: The first question on whether or not psychological biases or 'animal spirits' occur at the group level which then assumes a psychological explanation.

There is one additional complicating factor that needs to be discussed before starting this analysis. This is the idea that cognitive biases can occur at different stages of the decision-making process. We used the Fenton O'Creevy (2005: 83-109) break down of the decision process into the four stages shown below:

1. Diagnosis (Information Search Period)
2. Assessment (Options with cost and benefits looked at)
3. Action (The Challenge of Action)
4. Adjustment (Post-Decisional Process)

To justify a **psychological explanation** for financial crises, we **would expect to see biases occurring at different steps during the decision-making process**, even if some biases are more commonplace. The psychological explanations of financial crisis assume that actors are 'irrational' thus we would expect to see a more chaotic

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pattern of biases occurring at each step since each actor has a different predisposition to specific biases.

The results showed that **illusion of control** along with the **related cognitive biases of illusion of knowledge** and intuition occurred in 12 out of the 20 cases (60%). This bias occurs in **Stage 2: Assessment** – options with costs and benefits looked at.

In three of these cases (7, 19, 22) the students noted that employing a technical analysis trading strategy gave them the illusion of control. In one case (21) the students noted that fundamental analysis gave them the illusion of knowledge. This represents four out of the twelve cases or 33% of the cases with illusion of control and related cognitive biases.

A related theme which can also be seen as illusion of control is the denial that psychology (cognitive biases) play any role in technical analysis strategies. This occurred in three cases (4, 6, 22). Adding these two cases (case 22 is already in the above group) to the four cases above, we obtain six out of the twelve cases (50%) in which a particular trading strategy (mostly technical analysis) is directly linked to the cognitive bias of illusion of control.

This concurs with results from Fenton O'Creevy (2005: 99-100) who also found the **bias of illusion of control as very commonplace**. Under this bias one imagines personal control over chance events. Results for the computer-based experiment conducted by Fenton O'Creevy (2005: 101-103) showed that the trading environment can be conducive towards the illusion of control. Several factors are cited as follow:

1. Stress: arises from difficult external environment and from competition - other traders the ultimate competitor the market ('beating the market').

2. Implemental Mind-Set: since the focus is on achievement of goals the means justify the end thus less emphasis on in-depth analysis.

3. Choice, Involvement and Familiarity: use of certain 'skill cues' that support that one is in control. Choice, involvement, and familiarity all can act as skill cues. The traders are making choices in specific markets and in specific trading instruments thus this is how they identify and how they gain expertise.

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In addition, the **illusion of knowledge** and the **illusion of control,** two related cognitive biases, produce the related **bias of overconfidence** according to Nofsinger (2008: 16-18). He asks where does overconfidence come from. Partly from the illusion of knowledge since market actors believe that more information will improve forecast accuracy and subsequently decision-making. And partly from the illusion of control. **In short, market actors have the belief that they can exert control over events that are uncontrollable**. Illision of control is based on ability to make choices, results, information, involment and familiarity with a certain task. Thus, early positive outcomes, more familiarity with a task and a greater amount of information all increase the liklihood of illusion of control.

Overconfidence was cited in 10 out of the 20 cases (50%). Seven of these cases (3, 7, 19, 20, 21, 23 and 31) were also cited under illusion of control or knowledge, but three cases (8, 29 and 30) were not cited. It is highly likely that these non-cited cases were influenced by the illusion of control or knoledge biases although these biases were not mentioned directly. If that is the case, then in **15 out of the 20 cases (75%)**, the illusion of control and related bias of illusion of knowledge was experienced.

Herding was the second most commonly mentioned cognitive bias. The content analysis revealed an understanding of herding as either psychological, social or both. Herding under the social theme category required reference towards key words such as social, guru or reflexivity among others. It occurred in **eight out of twenty cases (40%) under the psychological theme**. A psychological explanation of crises would primarily employ the cognitive bias of herding. However, **herding occurred even more often under the sociological theme category with sixteen cases out of twenty (80%)**, including all eight under the psychological theme.

The only other cognitive bias of significance was **regret aversion** which occured in **six out of the twenty cases**. Regret aversion is the psychological bias of missing out on non-chosen outcomes.

Thus, **the evidence does not fully support psychological explanations** of a theory of financial crises, otherwise we would have seen biases more spread out in all the steps. Instead, we have overconfidence (illusion of control and illusion of knowledge related biases) in 75% of the cases (15 out of 20) that corresponds to Step 2: Assessment. Then the bias of herding occurs in 80% of the cases (16 out of 20) that

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corresponds to Step 3: Action. In addition, herding here is seen as more social than psychological in nature based on the content analysis of student reports.

In short, the answer to the first sub-question is yes. Psychological biases do occur at the group level but only with conjunction with particular trading strategies. There also **seems to be a link** between both the technical analysis and fundamental analysis trading strategies and the cognitive bias of illusion of control.

A **coherent analysis of these results** is achieved by employing the Fenton O'Creevy (2005: 83-109) decision process framework, we see that most biases (illusion of control, illusion of knowledge, overconfidence and regret-aversion) occur in **step 2: Assessment**. This is telling since once a trader chooses a certain strategy – technical or fundamental, he or she must have confidence (or overconfidence) that this strategy will succeed. This confidence (or overconfidence) is based on an illusion of control or knowledge.

When the results are not positive, **regret-aversion** is likely to occur. The traders each believing that they have a proprietary method or system, either technical or fundamental based, commonly cite the influence of herding. Herding however was seen as more sociological rather than psychological based on the content analysis of student reports. Thus, most of the proprietary methods or systems, either based on technical or fundamentals, will result in similar group behaviour.

Thus, in the search for a theory of crises, the evidence presented here points more towards a **sociological not a psychological explanation**. In short, the biases are more systematic than a psychological explanation alone would warrant.

What are and how relevant are psychological biases and social beliefs during real time trading? Purpose: The second question is concerned with identifying the main psychological biases and social beliefs and their relative importance.

More often than not, pschological and social factors are not well differentiated in the financial market. However, it is important that the distinction is made especially in regards to a theory of financial crises.

The only bias with a significant presence under the social theme banner was the cognitive bias of herding which occurred in sixteen out of twenty cases (80%). Using

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content/thematic analysis, herding under the social theme banner required reference towards key words such as social, guru or reflexivity among others. Eight cases could be seen as exclusively seeing herding as social while eight cases saw herding as both psychological and social, however leaning more towards social. There were no cases that saw herding as just pschological. The cases were roughly evenly split among fundamental and technical trading strategies.

A **nuanced view on herding** and the social/psychological explanations is seen in Schulmeister (2006: 220). He states, *'This pattern of signal generation of technical models implies that their users trade as if they were "herding" or "cascading" ...However, since every "technician" conceives a signal of his preferred model as private information, the concentration of transactions of technical models is caused by a common external factor, i.e., the logic of technical trading systems, and not by actual interactions between traders. In the taxonomy of Hirshleifer and Teoh (2003), the aggregate behaviour of technical models has therefore to be considered as clustering and not as herding or cascading.'*

Thus, concepts such as 'herding' that have psychological elements under the taxonomy above might not be appropriate terms in a social paradigm since this implies 'psychological biases' transcending to the societal level (see pages 35-36). A more appropriate term would be **'clustering'** which has social/institutional connotations.

Additional support for the process of clustering that has social implications can be seen by looking at the technical indicators used in the 20 cases. It should be noted that technical indicators are used in conjuction with one another. Thus even if we ignore the subjective intrepretive element, it is important to see if the same technical indicators are used in conjuction together by most traders.

Both the MA (moving average) and Bollinger Band indicators were cited in 12 out of the 23 cases. For the MA indicator there was an even split among FA and TA strategies. For the Bollinger Band indicator the split was 8 for TA stategies and 4 for FA strategies. Using the MA and Bollinger Band indicators as the base for consistancy on the use of indicators, the findings were that not a single case overlapped in terms of exactly the same indicators. This holds true for both FA and TA strategies. In fact, no two cases, irregardless of FA or TA strategy, matched regarding the use of similar indicators.

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Abductive Process Summary: analysis & connection/synthesis with literature

Q2: 'What is the role played by psychology, reflexivity and financial models?'

To summarize: the empirical results show that psychological biases do occur at the group level primarily in illusion of control and related biases such as the illusion of knowledge and overconfidence. In combination with the literature review, this can be viewed as a direct consequence of trading which takes place in a highly uncertain environment. To cope with this uncertainty, a particular financial discourse is needed. Some choose the technical analysis strategy, while others choose the fundamental analysis strategy. The choice of trading strategy or discourse is based on different assumption regarding EMH. In additional, there is evidence to support 'clustering' rather than 'herding' based on study of technical indicators implying a social/institutional explanation. For a more detailed discussion, please see **Chapter 2: pages 35-43**.

Potential Insights or Clues: need to focus on a potential macro to micro disruption mechanism and the sequence of factors in how a crisis unfolds. A nuanced view on herding, clustering and cascading provided by Hirshleifer and Teoh (2003) and Schulmeister (2006: 220) were used in analyzing the abductive notes. In addition, the taxonomy used here provides the basis for a potential macro to micro disruption mechanism. The technical indicator analysis also provided support for cascading. There was strong support here since not only did use of this taxonomy prove useful in the analysis of the abductive notes, but it is also consistent with the abductive literature.

Regarding the relative importance of the social and psychological factors, the abductive literature review, the Frydman and Goldman (2011) study along with insights from Fenton-O'Creevy et. al (2011) support the importance of social factors thus we need to consider the possibility that the sequence of the process could be first social and then psychological.

The next step would be to see how the potential macro to micro disruption mechanism fits in with the micro mechanism. In addition, different crisis process scenarios would need to be looked at to see where in the process sociological and psychological factors fit in, if at all.

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Q3: How are political/political constraints faced by governments accounted for by traders?

The one key delineating question was to ask how traders incorporate political factors during real-time trading.

How do traders account for political factors during real-time trading? Data: MSc Trading Class presentations (20 cases) Method: Content and thematic analysis of MSc Trading Class presentations (cases) with focus on role of politics on trading.

Summary of Results:

How do traders account for political factors during real-time trading? Purpose: To obtain insights on how traders incorporate political factors in trading decisions.

Politics played a major role in the decision-making process in five cases with all five cases employing a FA strategy. One case employed a macro trading strategy thus politics was incorporated in trading equities and foreign exchange. For the remaining four cases, political considerations were primarily focused on the energy sector, specifically oil.

Politics played a minor role in seven cases with four employing a TA strategy and three employing a FA strategy. For the three TA cases, it was awareness of the Greek Crisis or Yen depreciation due to earthquake. For one TA case it was awareness when making foreign exchange trades and minor role in one oil trade. The three FA strategies cases mentioned the Greek aid package On the FA strategy cases, the Greek aid package played a role with one case, one oil trade plus faulty application to the IT sector (more macroeconomic than political). Finally, politics played no role in decision-making for ten cases. Six of these cases employed TA strategies while four of these cases employed FA strategies

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The conclusions that can be drawn are that agents display 'bounded' rationality when it comes to politics due to the difficulty of obtaining and interpreting this information. The decision on whether to take politics into account is strategy or industry specific – global macro or the energy/oil industry respectively. For fundamental value investing or technical analysis strategies, politics either is not incorporated at all or it plays a minor role in decision-making.

Abductive Process Summary: connection/synthesis with literature

Q3: 'How are politics and political constraints faced by governments accounted for by traders?

The decision on whether to take politics into account is strategy or industry specific. The results of the quasi-experimental study show that politics is difficult to interpret and to act upon by traders. In general, a limited number of traders making the attempt to understand political events as a result of their trading strategy. The literature used two political frameworks: known/somewhat predictable or known or unknown/difficult to predict political events. These two frameworks result in 'confidence' or 'uncertainty' respectively. For more a more detailed discussed, please refer to **Chapter 2: pages 44-49**.

Potential Insights or Clues: relied heavily on background of researcher in providing a possible framework to better understand how traders view political factors. Thus, the abductive process here was heavily driven by the views of the researcher with the insight to split political events into two general frameworks. The researcher also had a strong bias that the incorporation of politics is critical in any theory of financial crises.

The ability of market actors to capitalize on known/somewhat predictable political events will be termed – **Framework I**. A bit more difficult to capitalize upon are known or unknown/difficult to predict political events that will be termed – **Framework II**. The first framework is related to market **confidence** whereas the Framework II is related to **uncertainty**. Finally, it should be noted that 'confidence' and 'uncertainty' can and do overlap.

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Part III: Model Modifications of Proposed Mechanisms

Further refinement of our results is needed before incorporation into a process-oriented theory of financial crises. Several areas were identified for further refinement, shown below.

First, model modifications would be needed for the DBO Model due to the 'micro-level' assumptions and overall complexity of the model. It is a reductionist model at heart, thus changes are needed to mitigate this issue and to bring the model more in line with the financial industry.

Second, we need to examine the 'fit' between the proposed macro to micro disruption mechanism (page 101) with the micro mechanism.

- **Model Modifications**

In finance, the **institutional aspects** are particularly strong thus the DBO-model needs to be modified to account for this reality. The trading and investment strategies depend on how one views the EMH. This is further detailed below.

The notion of a frame (or framework) in economics has been explored in the sociology literature. In the area of economic sociology, Michel Callon is the inventor of economic performativity. MacKenzie (2007: 3-4) states that Michel Callon (1998) does not see economics as a form of knowledge but as *'the construction of economic settings, actors, and institutions.... economics ...performs, shapes and formats the economy, rather than observing how it functions'*

Studies covering the performativity of economics are highly relevant for the financial industry. The concept of economic performativity can be viewed as the macro-level mechanism that exerts strong causal powers on actors in the financial industry.

An example of performativity in economics/finance is the efficient-market-hypothesis (EMH). It exerts strong causal powers on financial market actors. Mackenzie et al (2007: 4) provides the example of index-tracking funds which replicate market indexes. When a stock is removed or added to an index, these funds buy and sell exerting pressure on stock prices. Index-tracking funds are an outgrowth of the EMH and do not seek to beat the market.

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At this point, a closer look at the Beliefs, Desires and Opportunities parts of the DBO Model is needed to examine where modifications can be made to the model.

First, **Beliefs in the DBO Model** are seen by Hedström (2005: 47-51) are the result of social and psychological processes. On the social aspects, he mentions 'wolf pack' behavior which is coordinated behavior on the part of actors in an independent way. This should be seen as imitation in an indirect sense. As a belief, it can be either true or false. In addition, the idea of a 'self-fulfilling prophecy' is discussed. Here the belief is initially false, but this results in behavior that transforms it into a true belief. The example cited is bank runs.

The key point here is that it is the beliefs about what others believe in, not particular actions or the reasons behind them. **Uncertainty** provides an environment in which actors are more prone to being influenced by the belief of others.

Regarding the **psychological aspects, the focus is on cognitive dissonance**. This is when an interaction among actors where if others hold different views it can cause **strong dissonance** (uncomfortable feelings) especially if these others are important to the actor in question according to Hedström (2005: 51). To remove the discomfort, the actor could try to convince others to change their views or to go along with their views on the situation. Thus, the action of others affects the beliefs of an actor.

Second, **Desires in the DBO Model** for Hedström (2005: 52-54) are the result of primarily **social processes**. Three types of desires are mentioned. Hedström (2005: 52) notes that for all three types, the premise (Others do A) and results are the same. The difference lies in the mechanisms.

The underlying mechanisms either have a sociological or psychological basis. In the first type of desire (named **Type I: Action**), the underlying mechanism is mixed, comprising of both psychological and sociological processes. The action of others doing A influences how strongly I desire to do A is a sociological process. The mental state of cognitive dissonance (same as under Beliefs) can influence the likelihood that I will do A based on their doing A. This is a psychological process.

The second desire is named **Type II: Conformist**. The underlying mechanism here is sociological. It is simply a desire to be like others. Hedström (2005: 54) views this as a form of 'unconscious' dissonance. Individuals conform to majority opinion or

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gurus since there is a belief that they are better informed. In finance, this can easily be seen in the example of gurus. For example, we desire to be like them – Buffett and Soros.

Finally, **Type III: Opportunities** under the Desires part of the DBO Model are seen by Hedström (2005: 55-56) as mostly a zero-sum game in which the opportunities open for an actor are the direct result actions by other actors.

Finally, in **Opportunities in the DBO Model**, Hedström (2005) does not go far enough for finance and more importantly in the theory of financial crises being proposed in this study. In finance, opportunity sets are strongly defined by legal contracts between the investment manager and investors. Opportunity sets in finance are contract specific and depend on the strategy being followed and the eventual marketing to clients. In other words, the contracted strategy determines the opportunity set. This results in **legally binding (institutional) constraints** on action.

To showcase the stronger opportunity set in finance, we rename this part to **Institutional** and it can comprise of both a **static and dynamic component.** The static component, which is very important in finance, is exemplified by the legal and institutional rules and norms that all investment managers must adhere too.

The dynamic component develops over time with the result that the opportunity set becomes less profitable or constricted. This could result in investment managers expanding the boundaries of the opportunity set into ‘grey’ areas of closely similar investments (known as ‘style drift’ in the investment business). The reasons have to do with the reduced profit opportunities in the original opportunity set. For example, this occurred during the LTCM (Long Term Capital Management) crisis and the Quant Crisis of 2007. MacKenzie (2008: 225-229) states that LTCM developed a profitable strategy that eventually led to many copycat funds. To maintain profitability, LTCM started to invest in closely related strategies. This is known as ‘style’ drift and in many cases leads to increased risk.

The ‘grey’ areas are acceptable in a legal sense or legality is difficult disprove. In addition, if other investment managers employing the same strategy venture into the ‘grey’ area set then institutional investors and the investment managers would be tacitly accepting the new boundaries. A modified DBO Model now incorporates the

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stronger institutional framework present in the financial markets and addresses the criticism of Hedström and other social mechanists by Sawyer in Demeulenaere (2011: 79 and 84). Thus, the DBO Model can be now be renamed as the **BDI Model** which has been modified for the financial industry. Table 4 below highlights the DBI model.

Table 4: The BDI Model - An Actor Model from the Finance Perspective
Based on modifications to the DBO Model - Hedström (2005)

Beliefs	**Desires**	**Institutional**
Main Processes Psychological and Sociological – 2 types of mechanisms	**Main Processes** Mostly Sociological – 3 types of mechanisms	**Main Processes** Legal and Social Processes – 2 types of mechanisms
Cognitive Dissonance: psychological mechanism **'Wolf Pack' Behavior:** similar to 'herding' thus seen as mix of psychological and social. Example: bank runs	**Type I: Action:** mixture of sociological or psychological mechanisms **Type II: Conformist:** following Gurus **Type III: Opportunities:** the opportunity set available to investors.	**Static** – strong legal constraints on investment opportunities **Dynamic** – 'grey' area expansion of opportunity set by investment managers - sociological process.

- **'Fit' between the Proposed Mechanisms**

Next, we examine how the 'fit' between the BDI Model and the Macro to Micro Disruption Model based on studies by Hirshleifer and Teoh (2003) and Schulmeister (2006: 220). The three disruption mechanisms are herding, clustering and cascading.

Herding has psychological and sociological elements and was specifically mentioned by Hedström (2005) as falling under Beliefs in the DBO Model. Thus, we can propose that 'herding' disrupts Beliefs in the BDI Model through the 'wolf pack' behavior mechanism. **Clustering** is based on social factors thus a logical connection is Desires under the BDI Model. This fits in well since both individual investors and investment managers tend to invest similarly. Think of momentum traders or popular investment strategies. **Cascading** is the most complex since this involves a disruption on the actors. A possible path could impact cognitive dissonance under Beliefs (psychological mechanism) causing actors to see the need for major change. Thus, it

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would influence Type I: Action under the Desires (psychological and social mechanism). This would could then set off a chain reaction leading to changes under the Institutional part of the BDI Model (social mechanism). It is not inconceivable to see the process unfolding simultaneously through Beliefs, Desires and Institutional parts of BDI Model if the disruption were large enough.

A Guide to the Raw Data and Abductive Analysis Notes

Data and Abductive/Retroductive Analysis Notes are available on the CD Disk included with the thesis or Google sites at: https://sites.google.com/view/stdp-theory

Abductive Notes

Abductive Appendix I: Analysis Notes

Abductive Appendix II: Micro-Level Mechanism Notes

Retroductive Notes

Retroductive Appendix I: Counter-Factual and Thought Experiment Notes

Raw Data

Appendix A – EMH SPSS Output

Appendix B - Thematic Case Analysis 2010 – 2012

Appendix C – Main Themes

Appendix D - Ethical Issues

Appendix B – Thematic Case Analysis contains data which is proprietary/confidential and thus needs to be kept safe. Anyone granted access to Appendix B is asked to not distribute this appendix in any format – electronic or hardcopy. Only the External Examiners and my PhD Supervisors have access. Please note that Appendix B and C include 20 out of the 36 cases that were selected for content/thematic analysis. Appendix C is a condensed version of Appendix B with only the main themes noted. Thus, it is not raw data but refined data. In total, the Appendices contain roughly 152 pages of data not counting Appendix D. In addition, the Retroductive Appendix I contains counter-factual and thought experiment notes. These notes are particularly relevant to Chapter 5, which is covered next.

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Chapter 5: The STDP Theory of Financial Crises

Abstract

A process-oriented theory of financial crises is developed utilizing the theory-development research strategy of Retroduction. The STDP Theory consists of three mechanisms: macro-level, disruption and micro-level. The process of how a crisis unfolds happens through a 4-step macro-level process: Social, Trigger, Disruption and Psychological.

Key Words: Financial Crisis, Retroduction, Process Theory

In Part I, the focus is an explanation based on a structure or mechanism that leads to the development of a theory of financial crises. The Retroductive RS is used to address this question and to develop a theory of financial crises. In short, we address the following research question:

Why do financial crises happen?

The SDTP Theory provides a framework that focuses on the process of how a crisis unfolds. The answer to the research question above is from the point of view of understanding and explaining financial crises.

An overview of the STDP Theory will be presented with the 4-step Macro-Level Mechanism (Social, Trigger, Disruption and Psychological) and Disruption Mechanism. The development of the Micro-Level Mechanism is presented first with highlights of the contribution from the abductive process. In addition, we show the integration of all three critical mechanisms in the overall theory.

In Part II, we propose a crisis magnitude framework based on the process of how a crisis unfolds. This will later be used to help us compare crises in the case studies.

Before proceeding further, a visual overview of the SDTP Theory is provided in Diagram 3 on the next page. The four step macro-mechanism of financial crises is shown. The STDP Theory incorporates three mechanisms: macro-level, disruption and micro-level.

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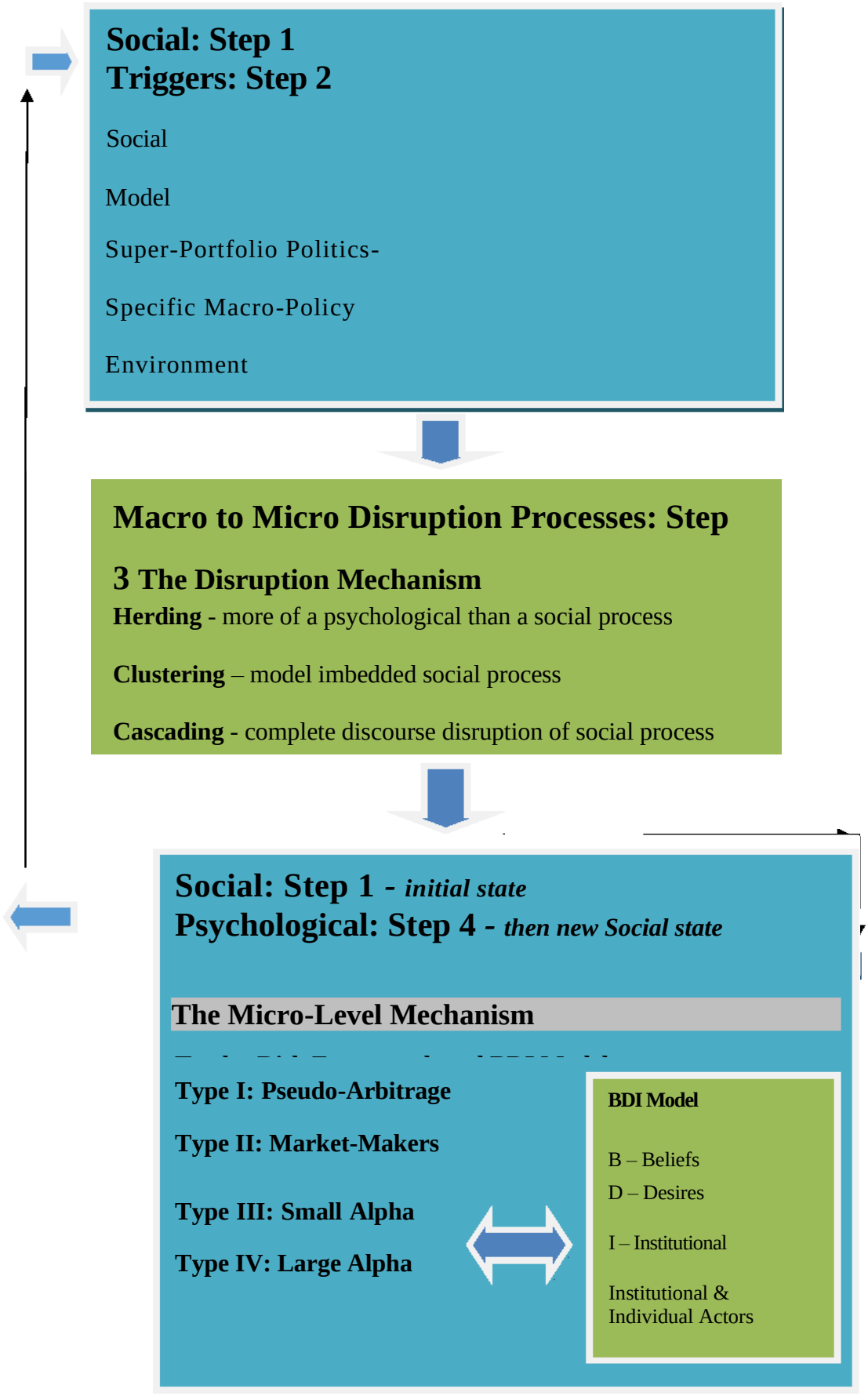
Diagram 3: The 4-step Macro-Level Mechanism – STDP Theory



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Part I: The STDP Theory: the process of financial crises

The theory of financial crises, as developed in this thesis, will be presented next. The name of the theory STDP represents the 4-step macro-level process. Thus, it clearly emphasizes social aspects before behavioral finance (or psychological) aspects.

In a broad sense, the steps of how a financial crisis unfolds can be broken down into four parts. First, clustering of trading opportunities and risk frameworks occurs in the financial market. Different trading/investment strategies become institutionalized with their own set of systems, procedures and ways of thinking or discourse. This is the social (and institutional) aspect of the financial markets. Second, when financial crises occur, the trigger of the crisis is localized within one or a few trading/investment strategies. Third, as the crisis unfolds, the 'discourse' (or the way the market is viewed) of an increasing number of market participants utilizing various trading/investment strategies is disrupted. Fourth, as the market participants utilizing various trading/investment strategies lose confidence, psychological and social processes result in change (new social state). On a continuum between social and psychological, the market swings towards the psychological end as things begin to initially break down but over time it reverts to a new social state setting the stage for the next crisis.

The 4-steps in The STDP Theory of Financial Crises are: social, trigger, disruption and psychological (then leading to a new social state). Each of these steps is discussed in detail in the following sections.

However, it is important that we first develop the Micro-Level Mechanism since this is **strongly linked** with the structure of market actors in Step 1: Social of the 4-step Macro-Level Mechanism.

Thus, this chapter will proceed as follow:

- Development of the Micro-Level Mechanism
- Discussion on how the Abductive RS contributed to the STDP Theory
- Development of the Macro-Level Mechanism and the Disruption Mechanism
- The STDP Crisis Magnitude Framework

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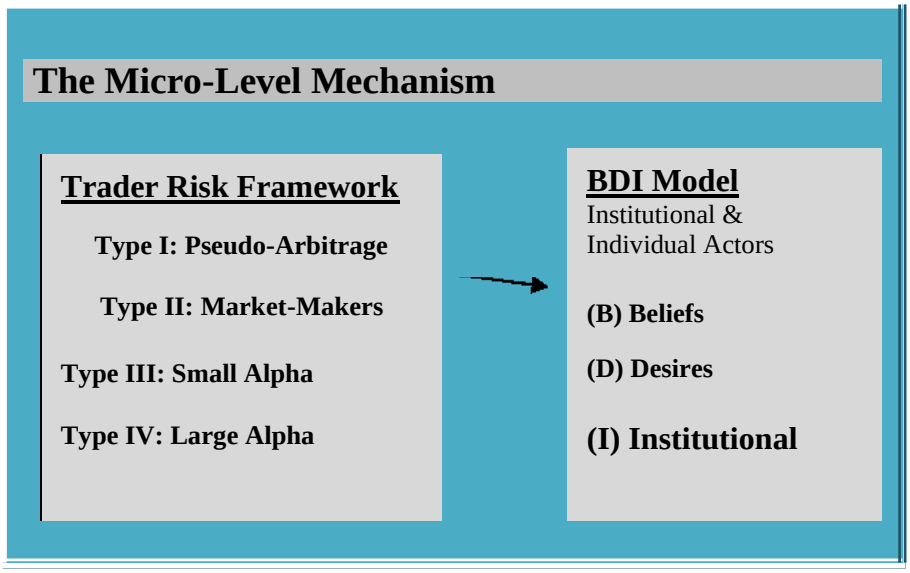
- **Development of the Micro-Level Mechanism**

Trading strategies have their own unique opportunity/risk framework, and these are institutionalized. The BDI Model developed in Chapter 4 incorporates the strong institution framework present in the financial markets.

The risk framework that we will elaborate on soon is strongly linked with the BDI Model directly at the Institutional (I) part. In short, both the BDI Model and the risk framework are integral parts of the Micro-Level Mechanism.

In short, this means that the **Micro-Level Mechanism** is developed by **incorporating a risk framework into the BDI Model**. The link is through the Institutional (I) part of the model. The incorporation of a risk framework helps to clarify and elaborate on the discourse/trading strategies that the various actors follow in the financial markets. This is shown visually in Diagram 4 below:

Diagram 4: The Micro-Level Mechanism of STDP Theory



Trading and investment strategies can be linked with a belief of the EMH (Efficient Market Hypothesis). In general, if the strategy is fundamental, the belief is weak-EMH. If the strategy is based on technical analysis, then there is no belief in the EMH. Finally, if an insider strategy is used, the belief is the semi-strong EMH. Different beliefs in the EMH along with the systems, procedures and risk framework all factor into the development of a trading strategy.

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A specific trading strategy requires a specific risk framework, all of which arise from the beliefs of that trading group. In the EMH/BF framework strategies have been divided into two main types. Here strategies are defined by the simple ‘dumb money - smart money’ framework. We can think of momentum traders (‘dumb money’ according to the finance literature) and fundamental traders (‘smart money’ according to the finance literature), then the following overview of trading styles captures the relationship.

These two main trading approaches have been institutionalized. The CFA (Certified Financial Analyst) and MTA (Market Technician Association) provide market particpants with proper creditials on the mastery of skills under each approach, respectively. The CFA is an an older organizagion which was started in 1947 (www.cfainstitute.org), whereas the MTA (www.mta.org) was founded in 1971. This institutionalization process that is encapsulated in the CFA and MTA matches the development of the Efficient Market Hypothesis (EMH) and the subsequent incorporation of Behavioral Finance (BF). Techinical analaysis is seen as the trading approach of the behaivoral finance (BF) side, thus the gradual acceptance over time culminating in the founding of the MTA.

The main frameworks on risk in finance are either based on the efficient market hypothesis (EMH) and behavioral finance (BF). Under the EMH this is represented by the securities market line (SML) and the mean-variance framework, while under behavioral finance (BF) it is characterized by prospect theory.

Market participants are treated as **homogenous with the same information sets** under EMH. Thus, risk preferences are seen simply as risk-taking or risk-adverse based on a choice between the risky asset (market portfolio) and a risk-free asset. Prospect theory takes this one step further by including a reference point (wealth) that determines individual actor behavior regarding risk. Below the reference point, actors are risk-taking and above the reference point actors are risk-adverse.

To further add context to our understanding, we need to discuss Modern Portfolio Theory and the mean-variance framework that was developed by Markowitz (1952). The market portfolio is assumed to be diversified of all non-systematic risk (company specific) with only systematic risk (economic, political risk affecting all stocks) remaining. These ideas have given a theoretical underpinning to the mutual fund

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industry that attempts to recreate this hypothetical market portfolio (typically seen as the S&P 500 Index) mathematically by using only 70-90 stocks out of 500 stocks.

The problem with this view in practice is that the 'market portfolio' does not exist since the 500 stocks in the S&P 500 do not represent all assets, only the biggest stocks. For example, the market portfolio does not include, small company stocks, private business, real estate, art or other assets. In addition, the mathematical calculations needed to construct the cost-efficient 70-90 stocks that attempt to replicate this 'market portfolio' are complex and require a computer after the portfolio exceeds two or three stocks.

The calculation of risk is based on a number called B (beta) that represents how risky that individual stock is compared to the 'market portfolio' (in this case the S&P 500) has a B equal to 1 by definition. Thus, a stock that is roughly twice as risky would have B=2 and a stock half as risky would have B=0.5. Under the Markowitz mean-variance framework, each stock added to the portfolio must optimize the return for a given risk for the portfolio of 70-90 stocks.

However, these calculations face **two critical issues**, especially in times of crises. The Markowitz mean-variance framework relies on the concept of diversification. Under this framework, diversification depends critically on the beta (B). First, **betas for individual stocks are not very accurate**. They vary depending on the time period chosen to do the calculations and changing business strategy, etc. For example, beta of Apple could be 1.3 according to J.P. Morgan, 1.5 according to Yahoo Finance or 1.65 according to Goldman Sachs. Second, **during a crisis most stock betas approach 1**, equal to the beta of the 'market portfolio' and thus defeating the benefits of diversification.

It should be stressed that the EMH has the underlying assumptions that you cannot beat the market, thus diversification is a strategy to copy the market while minimizing cost. The opposite view to the EMH approach is non-diversification strategies.

Thus, instead of embracing diversification, alternative investment strategies follow a **concentrated or focused trading/investment approach**. For example, there are hedge funds which invest in only 10-30 stocks. Implicit in this stategy is the belief that the market can be beat with better interpretation and access to information.

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To help us understand the risk framework adapted from Fenton O'Creevy et al (2005:112-116) we will classify traders into different risk groups. This is a **preliminary categorization** and is shown in Table 5 below:

Table 5: Preliminary Trader Type according to Risk Framework

Adapted from Fenton O'Creevy (2005)

Type 1 Pure Probability Calculus (Renamed: **Pseudo-Arbitrage)**	**Mathematical Models – extensive use** Lots of bets are required in this type of trading. Diversification and risk management are paramount here. Traders (investors) using this type of risk framework would include passively managed Mutual Funds and most TA strategies such as Quant and High-Frequency Hedge Funds. Momentum trading strategies predominate here, thus CTAs and Global Macro (systematic) also fall in this category.
Type 2 The Multi-Player Game (Renamed: **Market-makers**)	**Insider Strategies – access to proprietary information** Lots of bets are required in this type of trading, but the bets are made with better odds due to insider information. Proprietary trading at banks and investments banks with access to order flow and market-makers on the exchange floor would characterize traders in this group. Banks have access to loan data. Flow strategies prevail here since these types of traders make money by anticipating past market action to which they have privileged access. A good example of the type of trader under this risk framework would be the proprietary FX traders at Citibank since they have access to trade flow data from FX customers. Cargill in the soybean market. Important to incorporate the flows/actions of other players in the markets here.
Type 3 The Formbook Gamble (Renamed: **Small Alpha**)	**Information is costlier to obtain: fundamental strategies prevail** Less and more selective bets are required for this type of trading (investing). Traders (investors) using this type of risk framework would include active Mutual Fund managers, Long/Short Hedge Fund Strategies (especially on the short side).
Type 4 The Incalculable Gamble (Renamed: **Large Alpha**)	**Concentrated Investment Style – Intense Informational Needs** Concentrated trading and market timing. Information gathering is intense and expensive and focused on Macro, Economic, Political and/or Legal areas depending on the type of bet. Traders (investors) using this type of risk framework would include Macro Hedge Funds, Distressed Securities Hedge Funds (focus on legal aspects), and insider strategies like Venture Capital Funds and Private Equity Funds. On the Venture Capital Funds, 10 investments could be made with firm betting that 2 investments would result in supersized returns. Diversification, as in the sense of the EMH, is not followed under this risk framework. The approach is to reduce risk using intense knowledge of the situation. Finally, contrarian thinking predominates as a trading strategy - Macro Hedge Funds.

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As shown in the previous discussion, the risk framework in the Micro-Level Mechanism has **four risk types** based on the work of Fenton- O'Creevey et al (2005). This will be further refined under the first step (Social) of the **Macro-Level Mechanism**, as more detail is provided on the market actors using the four risk frameworks to carry out their trading strategies.

Under the four risk types, an important consideration is how similar the strategies are according to the specific trader risk framework. In short, market participants use a particular risk framework depending on their market beliefs and institutional constraints. Note that our focus is clearly on the institutional manager and that individual investors that for the most part invest in various institutional strategies.

- **Discussion on how the Abductive RS contributed to the STDP Theory**

At this point it is important to step back and discuss how the abductive studies contributed to the development of The STDP Theory of Financial Crises. To help us address this contribution, it is important to first provide a broad overview of how the three mechanisms are linked. This is shown in Diagram 5 below.

Diagram 5: Links between the Three Mechanisms

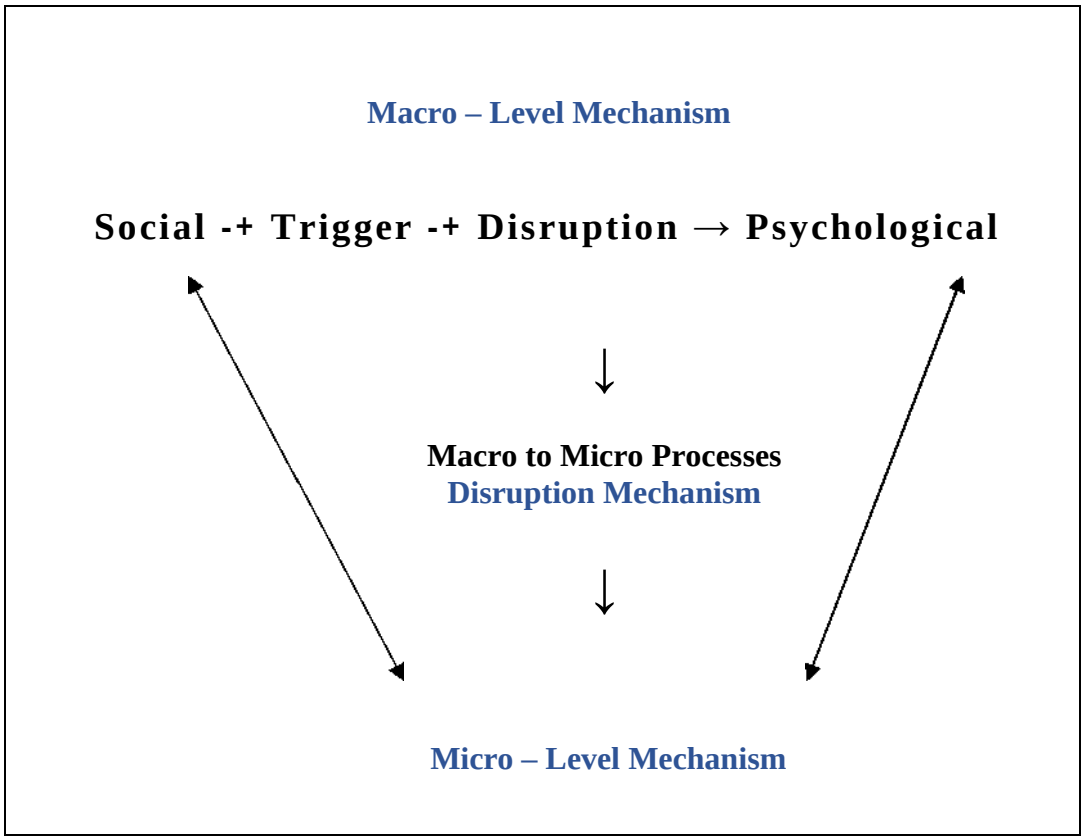

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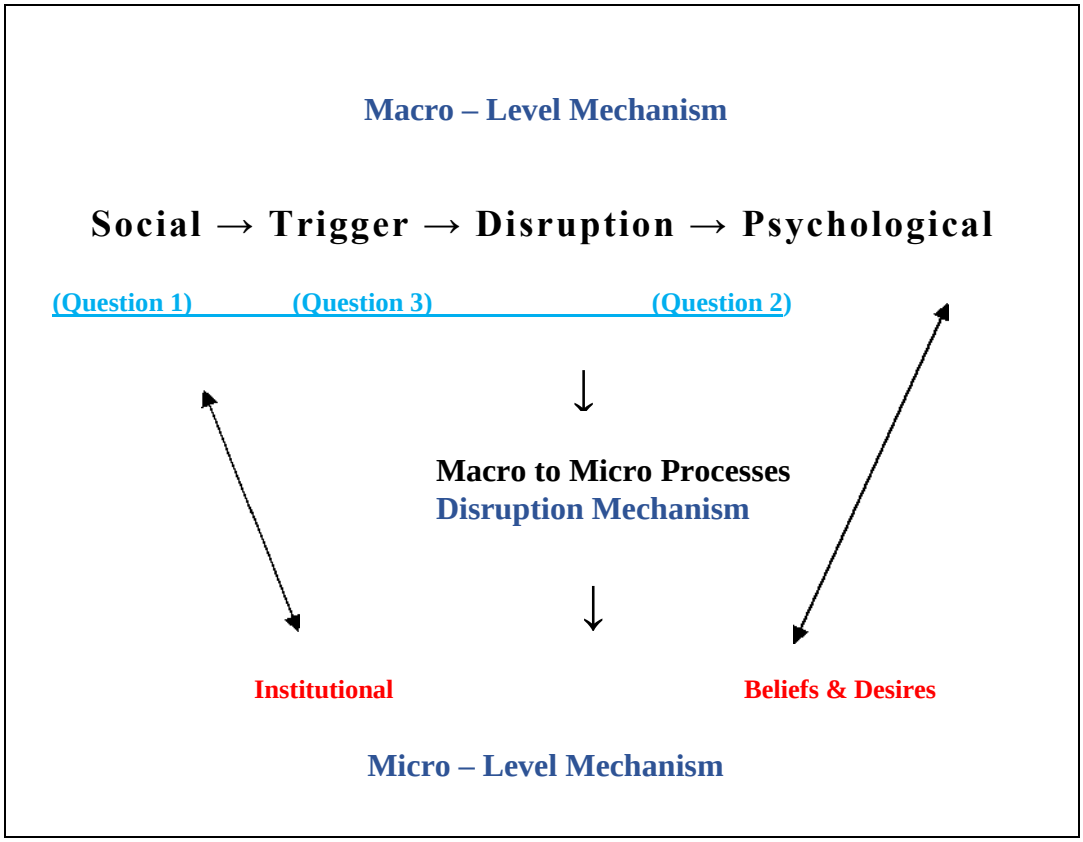
Diagram 5 shows that there are three main links between the three mechanisms. The diagram implies that the Micro-Level Mechanism is well integrated with the Macro-Level Mechanism. The first link is between Social, the first step in the Macro-Level Mechanism, and the Micro-Level Mechanism. The second link is between the Disruption, the third step, and Disruption Mechanism. Finally, the third link is between Psychology, the fourth step 4, and the Micro-Level Mechanism.

Next, Diagram 6 visually illustrates the links with the Abductive questions.

Diagram 6: Visual Contribution of the Abductive Questions



Looking at Diagram 6 above the contribution of the three Abductive questions are as follows:

Question 1: Why do traders hold certain views of the market?

The empirical results from the survey and the content/thematic analysis from the trading cases studies are consistent with the 'multiple equilibria' and 'heterogeneous' agents view of the market. A key finding or 'clue' was that financial discourse acquired through an education in finance and later through trading experience plays a

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key role in shaping trader views towards the EMH and subsequently towards a particular trading strategy.

Regarding the Macro-Level Mechanism, this is represented in how financial markets are structured in Step 1: Social. For the micro-level processes, this is opportunity set available to the actors that is represented under the Institutional (I) of the BDI Model. The **institutional character of the financial markets** strongly affects what opportunities actors may pursue, thus the arrow pointing in both directions from Social (macro-level) to Institutional (micro-level).

In terms of the process-tracing tests the evidence presented here can be considered of the 'smoking gun' type – unique but not certain. The type of evidence was statistical analysis (pattern-matching type evidence) along with content analysis of student comments ('confessionals'). Additionally, the abductive process (lay to scientific process) provided proof in the form of academic studies – abductive literature review.

If we **assume that the Micro-Level Mechanism is similar** in all the crisis cases, it means that sequence type evidence might be present. This is an important assumption that will **greatly simplify the analysis of crises**. It might not represent all crises in different historical periods but there no reason why modifications cannot be proposed.

Question 2: What is the role played by psychology, reflexivity and financial models?

The order of steps in the model (Social before Psychological) and the insight that Disruption comes before Psychological in the 4-step Macro-Level Mechanism is a key assumption behind The STDP Theory of Financial Crises.

The background of the researcher was critical here since many different scenarios of how crises unfold were examined and intuition was used to arrive at this possible sequence. The use of counterfactuals and thought experiments played an important part. The sequence developed over several years of trial and error experimentation.

In terms of process tracing tests, this is clearly sequence type evidence. In other words, does the causal model explains the temporal processes of how a crisis unfolds. This is tested with several case studies in the next chapter. What we are looking for is sequence type evidence that is consistent with the four-steps of the Macro-Level Mechanism providing support that the social step precedes the psychological step.

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The abductive study provided some evidence or 'clues' that social aspects should be given more weight as a causal factor versus psychological aspects**. The evidence here was not strong**, but it **stimulated thought on alternative sequences** of how crises unfold. In short, the abductive process led to an 'insight' or 'clue' that opens the possibility to ask if it is logical and reasonable that the sequence of how a crisis unfolds could have happended in this way. This then stimulated further thought into how the overall process might work which also led to a search for answers on a macro to micro disruption process.

Question 3: How are politics and political constraints faced by governments accounted for by traders?

In short, the abductive study just confirmed that not everyone considers politics when trading and this is highly dependent on their trading strategy and their assets traded. Since this was a limited result, the **experience of the researcher** to develop a plausible explanation was critical. The key insight was to view politics under two frameworks: confidence and uncertainty. This provides a more sophisticated view of political events under Step 2: Trigger in the 4-step Macro-Level Mechanism.

- **Development: Macro-Level Mechanism and the Disruption Mechanism**

In this section, the four steps of how a crisis unfolds are discussed in detail. As discussed earlier, the Disruption Mechanism is presented in the third step.

First Step: Social

As discussed earlier, market participants employing particular trading/investment strategies, utilize and follow a specific set of systems, procedures and ways of thinking. Over time this becomes institutionalized. Market action by these specific actors can best be described as clustering in well-defined groups. In other works, the systems and procedures within these strategies play a big part in the trading undertaken by the actors.

Employing 'multiple equilibria' and heterogeneous agent assumptions are consistent with the literature review and empirical findings in Chapters 2 and 4 respectively. The simple 'rational' investors versus 'irrational' investors framework (also framed as 'smart' money versus 'dumb' money) is clearly an inadequate representation of the

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market. Further supporting the importance of a specific risk framework matched to a specific trading strategy is Lo (2008: 24-25) in his discussion on hedge funds. He states, *'...empirical results suggest the need for a more sophisticated analysis of hedge fund returns...the number of unique hedge fund-risk models may have to match the number of hedge fund styles in practice.'*

Considering 'multiple equilibria' and heterogeneous agent assumptions, we have simplified trading strategies into four risk types following the work of Fenton-O'Creevey et al (2005). The addition of market actors to the various categories was based on the author's industry knowledge plus the works of Belmont (2011), Jaeger (2008) and additional information from Morningstar, AIMA and Hedge Fund Research. Next, we provide a brief overview of the most active strategy - hedge funds.

Notes on Key Players

Pension funds and university endowment funds are mostly **long-term institutional investors** that invest in bonds, mutual funds, hedge fund trading strategies, private equity and venture capital. For example, they invest funds to meet future payouts – retirement salaries and education spending.

Other key players such as banks, insurance companies and individual investors are discussed under the relevant risk framework and/or in the case studies.

Hedge Fund Industry

According to Ineichen and Silberstein (2008) in AIMA's Roadmap to Hedge Funds 2008, the industry became more institutionalized starting around 2000. The main investor groups are: high net worth individuals (HNWIs), endowment funds, insurance companies and pension funds. In terms of making investments, pension funds have the most restrictions on one end whereas HNWIs are the least restrictive. Thus, institutionalization of the industry means that more and more of the investor types were pension funds or closely related groups such as insurance companies.

In practical terms, this means that the popularity of hedge fund investment strategies changed considerably due to institutionalization. For our purposes, the most striking move was from the Macro (or Global Macro) category which accounted for 39.3% of all hedge fund assets in 1990 to 11.6% in 2000, 18.9% in 2005 and 16.6% in 2008. In

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short, it went from 1st place to 4th place after 2000. Global Macro is seen as the 'cowboy' strategy where the hedge fund manager can take large directional positions. The returns can be variable, too variable for institutions like pension funds. Thus, the increased popularity of hedge fund strategies with less volatile returns such as: long-short equity, event-driven and relative-value. The result is that the industry became more commoditized and took less risks especially on large directional trades.

As noted, the Long/Short Equity hedge fund strategy took off during this time period. It overtook the Global Macro strategy in terms of assets under management (AUM). The peak year was 2000, where it accounted for 56.3% of all hedge fund AUM. During the 2005 - 2008 period, it was still the leading strategy in terms of AUM at around 35 – 39%.

According to Ineichen (2012) in AIMA's Roadmap to Hedge Funds 2012 report, total assets under management (AUM) peaked in 2007 at 1.868 Trillion USD and fell sharply to 1.407 Trillion USD in 2008. It then took several years to recover to the 1.917 Trillion USD level in 2010, eventually reaching 2.192 Trillion USD in 2012. In 2008, 390 hedge funds of more than 1 Billion AUM accounted for 80% of all hedge fund AUM. Thus, money is concentrated in only a few big funds.

While these numbers are large in absolute terms, they are small in relatively to other investment categories. For example, global **mutual funds had AUM of 21.8 Trillion** (AIMA's Roadmap to Hedge Funds 2008).

However, hedge funds use **leverage and are much more active** in the market whereas 80% of mutual funds are buy and hold passive strategies designed to mimic an index. For example, **leverage ranges from 3x to 20x** for some strategies and accounting for the much greater trading volume done by hedge funds, we can see that they are more important than based on AUM. In addition, pursuit of active strategies means that they are generally the **leading players** in the market, especially short-term.

Their role in crises varies and is controversial. In the ERM Crisis of 1992, the global macro fund managed by George Soros played a role. During the Quant Crisis of 2007, quantitative hedge fund strategies were the leading players. The Dot.com Bubble was a catastrophe for some hedge funds. In the Asian Crisis of 1997 and the Euro Crisis in 2010, politicians blamed hedge funds, but their role and impact are controversial.

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In addition, the **high-frequency hedge fund strategies** started to make their presence felt in terms of **equity trading volumes in U.S. equities and other products**. These strategies first appeared in the mid to late 1990s but did not really take off until the early 2000s as advances in trading technology took off. Sang (2009) of the Aite Group estimates that High-Frequency Trading (HFT) firms accounted for almost 50% of all equity trading volume in 2007. This increased to slightly more than 60% in 2008 and an estimate of around 70% in 2009. In an article published in the Hedge Fund Journal on the 29th of September 20ll, the 60% figure for equity trading volume is confirmed. The main players were investment banks (46% of total HFT volume) and dedicated HFT firms, plus some hedge funds.

Trader Risk Frameworks

Type I: Pseudo Arbitrage

Under the Type I risk framework shown in Table 6 on the next page, **models and quantitative strategies dominate**. This also includes passive mutual funds, which are essentially closet index funds. Passive Mutual funds, around 80% or more of the total, are underpinned by the **Markowitz portfolio theory and use portfolio optimization tools for asset selection**. In short, this is based on optimization software that relies on EMH. Most of the Relative Value hedge fund strategies also **rely on an EMH model to define 'fundamental' value** and then employ reversion to the mean strategies.

Insurance companies are also a big player since they have their own branded passive/active mutual funds. In addition, they are long-term institutional investors they invest in various investment and trading strategies such as mutual funds, hedge funds, private equity and venture capital. The premiums that insurance companies collect on behalf of clients are invested to meet future payouts on life insurance policies for example. To succeed, insurance companies use a highly quantitative method – actuarial science, to estimate risk and price insurance policies. In short, they rival mutual fund companies with their own branded funds that are embedded in life insurance policies. At the same time use Markowitz portfolio theory to invest in hedge funds, private equity and venture capital. In effect, covering all four risk frameworks.

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Table 6: Type 1 Pseudo-Arbitrage **Source: Author, Belmont (2011: 143 -238) and Fenton-O'Creevy et al (2005)**	
Market Actors	**Main Risks Faced**
Main Mutual Funds (Passive Management – 80% of industry) Insurance Companies (own passive mutual funds) Hedge Fund: High Velocity Algorithmic Trading **Other Actors** Hedge Funds: Convertible Bond Arbitrage, Statistical Arbitrage, Fundamental Arbitrage, Fixed Income Arbitrage, Capital Structure Arbitrage, CTAs	Systematic Risk (main for Mutual Funds) Basis Risk Operational Risk Portfolio Liquidity Risk Funding Liquidity Risk Model Risk, Credit Risk Idiosyncratic Risk

Type II: Market-Makers

Table 7 on the next page shows Type II: Market-Makers actors. These actors are the **most important of the four types** in that they provide liquidity, mediate between lenders and savers, offer risk mitigation services, etc.

The main actors here are **banks and investment banks**. These actors are especially important during banking crises. In addition, **exchanges** (stock and commodity) and **prime broker services** (banks and investment banks) control and set margin trading requirements. Thus, in a crisis, they might increase margin requirements or have a margin call on a market actor, in effect stopping all trading and forcing the actor to liquidate positions. Note that prime brokers provide funding and trading services to hedge funds thus can play an important role in terms of liquidity.

Note that the definition of banks here is closer to money-center banks versus main street banks. Both banks and investment banks are engaged in activities that overlap with hedge fund strategies. For example, many investment banks have trading units engaged in Pseudo-Arbitrage (Type I) all the way to Macro (Type IV) activities. However, it should be noted that in some trading activities (FX speculation), Type II actors have the advantage of flow data (deal flow) thus they don't rely on technical analysis.

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However, after the Credit Crunch many of these trading units at the banks were spun-off due to regulations. What is of interest is the role that banks and investment banks play in providing funds to financial market actors through their **prime brokerage services** and subsequently how the various actors are affected by funding liquidity risk. An example of this was the Long-Term Capital Management Crisis in 1999.

Finally, Type II Market Makers is prone to the risk of crowded trades and in certain market crises the line between Type I and Type II strategies might be blurred and they in effect act similar.

Table 7: Type II Market-Makers

Source: Author, Belmont (2011: 143 -238) and Fenton-O'Creevy et al (2005)

Market Actors	Main Risks Faced
Main	Counterparty Risk
Banks (Money-center)	Basis Risk
Investment Banks	Operational Risk
Stock and Commodity Exchanges (NYSE, CME, ICE, etc.)	Systematic Risk
Prime Brokers at Banks, Investment Banks and Independent	Credit Risk & Funding Liquidity Risk
Proprietary Trading Desks – Banks and Investment Banks (Flow Data, i.e. FX desks)	

Note that for the Type II risks the Main Risks Faced section was estimated. It is very similar to Type I, except there are fewer players in the market, thus the risks should be similar.

The next two risk framework types, Type III and Type IV, are **smaller players** but because they have active strategies, these two can in certain cases precipitate or lead market action.

Type III: Small Alpha

Small Alpha market players as seen in Table 8 on the next page consist of two similar players with varying institutional constraints. The hedge fund category of **long/short equity** has more flexibility than similar active mutual funds that have greater institutional constraints.

An emerging market mutual fund that is actively managed faces the same sort of decisions that a long/short equity fund focused on the same emerging market faces.

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Both funds need to intimately understand the politics of that country. The same is true for a bio-tech fund whether it is an actively managed mutual fund or hedge fund.

Table 8: Type III Small Alpha

Source: Author, Belmont (2011: 143 -238) and Fenton-O'Creevy et al (2005)

Market Actors	Main Risks Faced
Main Long/Short Equity Mutual Funds (Active and less flexible than Long/Short Equity but can pursue similar strategies)	Concentration Risk Idiosyncratic Risk Basis Risk (less impact) Systematic Risk (mitigated by L/S Equity)

Type IV: Large Alpha

In Table 9 on the next page, Type IV: Large Alpha market actors are at the other end of the risk framework spectrum. These are strategies that for the most part do not rely on an EMH model and reject the concept of diversification. Investment strategies here are **very concentrated** and **deep knowledge** of an opportunity is required to successfully execute profitable trades or long-term investments. The variance between the types of investors in this risk framework is large. On one end, you have hedge fund strategies (macro, emerging markets, and sector-focused L/S equity HFs) that are quickly in and out of markets. On the other end, you have private equity and venture capital firms that invest for the long term (2 to 10 years).

These are important players for several reasons. First, some of the most innovative companies are a result of venture capital investment. These companies greatly affect the **sentiment of the equity markets with new market disruption technologies**. Second, more companies these days have been taken private and off the equity stock market exchanges due to private equity players.

Macro hedge funds although they do not occupy the same relative importance in terms of overall asset allocation to hedge funds as in the past, they still can play a **'guru' or first mover role** especially during a crisis or difficult to understand geo-political situations.

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Table 9: Type IV: Large Alpha

Source: Author, Belmont (2011: 143 -238) and Fenton-O'Creevy et al (2005)

Market Actors	Main Risks Faced
Opportunistic: Macro, Emerging Markets and Sector-Focused Long Short Equity. There is a further split here between big-picture (broad) and political focus. Event-Driven: Merger Arbitrage, Distressed Investing, Activist (including Private Equity and Venture Capital)	Systematic Risk Concentration Risk Idiosyncratic Risk Funding Liquidity Risk Event-Driven: add credit risk and portfolio liquidity risk

Final Comments

Strategies mentioned under Type I can drift towards Type II due to 'crowded' trades and the formation of so-called 'super-portfolios', which will be discussed later.

The previous analysis and categorization of the various trading/investment strategies into groups and then into risk types clearly shows the different ways to find opportunities in the market as well as the main risks inherent within each strategy.

In short, we end up with four main market actors based on the opportunity/risk framework developed earlier. However, within each category there are more actors.

In summary, the First Step: Social shows how the same systems, procedures, opportunity sets and risk frameworks for specific market actor types (pseudo-arbitrage, market-makers, small alpha and large alpha) determines the mindset of the market actors, which over time becomes institutionalized. Thus, under BDI Model, the Institutional (I) part plays a large role in determining action in the global financial market. This is true during normal and crises periods.

Thus, the **market actors operate with different opportunity sets/risk frameworks, time horizons and degrees of flexibility**. This agrees with the literature on multiple heterogeneous agents as discussed earlier in the Chapter 2.

In addition, we can expect to see market actors behave differently over the course of a crisis. They will be some similarities, but these similarities might have a time component which could be different.

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Second Step: Trigger

The question (How are crises triggered?), has two parts. First, how close are relevant actor strategies to the epicenter of the crisis? Second, how disruptive and broad is the crisis?

As a crisis develops it affects one or more groups that have a discourse (or antenna, if you wish) tuned into the specific loci of a particular crisis. In other words, crises are triggered first in one or more specific actor types or strategies grouped in a specific risk framework.

Each trading strategy focuses market participants on particular information. A crash occurs when a group of similiarly minded market participants trigger it. As was shown in Chapter 2, rationality is more focused and specific than conceptualized under 'bounded rationality.' We can use the term 'selective bounded rationality.'

The idea that crises are triggered by market actors socially provides a possible answer for the fact that Early Warning Systems (EWS) fail to predict some crises when all quantitative factors are present. It could be that a crisis is not triggered because the market actors socially believe otherwise.

Using the concept of a social localized crisis trigger allows the explanation of some crises that did not fit neatly into a category. The 1987 Black Monday Crash is a good example here. Reinhart and Rogoff (2009: 250) state, *'...the Black Monday crash of October 1987 ...is not associated with a crisis of any other stripe.'*

The 1987 Black Monday Crash is a crisis that affected all the risk frameworks (Type I, Type II, Type III and Type IV) since derivative hedging replication strategies failed. Almost every investment and trading strategy utilized this new financial innovation to hedge risk. Thus, the crisis was a financial model crisis that did not take into account social aspects of the market. One of the most cited reasons was that most market participants purchased the portfolio insurance at the same time flooding the market makers. Thus, what started as a Type II crisis quickly spread to all the other risk framework types.

Finally, politics can be seen as an important contributing factor especially during currency crises. For example, the 1997 Asian Financial Crisis was first triggered by

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a currency crisis in Thailand. The question is why did it occur in 1997? Economic variables for the most part did not provide an early warning that something was wrong. Yet most Global Macro funds and some Emerging Market funds managed to escape the affects with some profiting. Did politics play a role here? The political situation needs to have some sort of stability in order for actors to have 'confidence' in the currency of a country. Did these two actors – Global Macro and Emerging Markets – pick up political problems early with the resulting loss of 'confidence' in the Thai Baht? This will be discussed later in a case study.

Politics can be seen as key variable in predicting currency (FX) crises. Policy responses can be more complex, as was seen during the failure of Global Macro funds to anticipate policy moves and to make money during the Euro Crisis of 2010-2012.

In addition, the first three crisis triggers (Social-Specific, Model-Specific and Super-Portfolio) are linked and in many cases occur together. We can term these crisis triggers as **social crisis triggers** since the underlying sociology of the market (institutional framework) is the fundamental cause. However, the three crisis triggers are also different from each other and thus a better way to look at them would be as sub-categories of a social trigger.

The Social-Specific trigger can be thought of as mostly affecting non-institutional investors and institutional investors are less quantitative in nature. For highly quantitative strategies, the Model-Specific trigger is more relevant. Finally, the Super-Portfolio trigger usually involves institutional investors who can be non-quantitative or quantitative. The Politics-Specific/Macro-Policy Environment triggers are different than the first three triggers, therefore this warrants a separate discussion.

They can be broken down to four main types as follows: Social-Specific, Politics-Specific (and Macro-Policy Environment), Model Specific and Super-Portfolio.

1. **Social-Specific:** both momentum and fundamental strategies can contribute to prices building up to asset bubles. A good example of this was the internet stock price rises during the 2001 Dotcom Bubble. If price is seen as being socially determined, then a social-specific trigger is especially relevant for asset bubbles. This is most common in risk frameworks Type I & Type II.

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2. **Model-Specific:** numerous strategies employ quantitative models in finding and capitalizing on opportunities. The models work well under specific circumstances. Recalibration allows some flexibility allowing models to deliver in slightly changed circumstances. However, when circumstances change significantly enough, models fail and this triggers a crisis. The Model-Specific trigger is most commonly found in Type I and Type II risk framworks, but on occasion it can occur in all risk frameworks as happenned during 1987 Black Monday. The effect this crisis are even felt today in the form of the option volatily smile – higher prices for out-of-the money options.

3. **Super-Portfolio**: when numerous strategies invest in the same opportunities, there is a risk that 'unconsious' coordinated action creates a large portfolio. When the actors need to liquidate the portfolio, there are no buyers for the assets since most of the actors are selling. An analogy here is a fire at a theatre and everyone runs for the same exit. The Super-Portfolio trigger is associated with the Model-Specific trigger and they usually occur together, thus Type I and Type II risk frameworks are the most most comonly affected.

4. **Politics-Specific and Macro-Policy Environment:** politics can affect both 'confidence' and 'uncertainty.' The best example of the political impact on 'confidence' is currency (FX) crises. It also creates 'uncertainty' as well but the primary effect is 'confidence.' Policy responses as a result of changing economic conditions and reaction to crises primarily increase 'uncertainty' but also impact 'confidence.' In other words, monetary policy and crisis response imply a different dimension than the politics involved during a currency (FX) crisis. This can be termed Macro - Policy Environment (MPE). Also included under MPE is **geo-political considerations** (termed **Geo-Political Trigger**) that can act to **reduce 'uncertainty' in a crisis due to strategic considerations**. The Politics-Specific trigger is most common in Type IV risk framework, but specifically with Global Macro and Emerging Market Funds. However, it can also affect all strategies in a general sense during a crisis (discussed in more detail in the next step). In some cases, Type IV risk framework actors, specifically Global Macro and Emerging Market Funds, are better able to predict the Politics-Specific trigger, thus causing the trigger to occur sooner.

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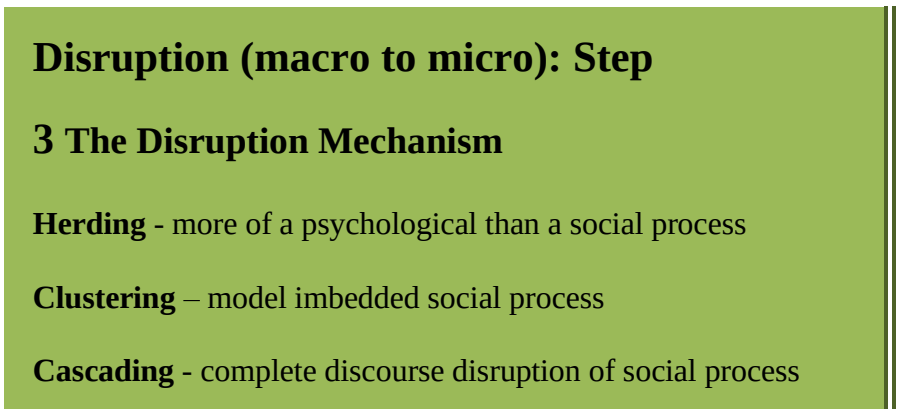
Third Step: The Disruption Mechanism (Macro to Micro)

As the crisis unfolds, the 'discourse' (belief systems) of certain market participants becomes less convincing. In other words, these market participants have lost confidence momentarily in their chosen (preferred) discourse and the viability of their trading strategy. For example, believers in the EMH view run passive mutual fund strategies and thus begin to lose faith as the market sharply drops.

Discourse is the belief system or logic by which market participants make decisions. Once this logic is rendered ineffective, the market participants are more open to the influence of social and psychological factors.

From Chapter 2: Abductive Literature Review, it was shown that the main discourse in finance (EMH) can change through experience or external shocks. For example, most of the students' belief in the EMH was stronger before the start of trading. In addition, this strong belief may have prevented them from seeing the importance of alternative views since they were blinded by their belief system - the Efficient Market Hypothesis (EMH) with behavioral finance (BF) to account for abnormalities.

Diagram 7: The Disruption Mechanism – STDP Theory



Now, we will look at the three processes of herding, clustering and cascading in more detail. These three processes are part of the Disruption Mechanism shown in Diagram 7 above. In short, they provide the link between Step 3: Disruption of the 4-step Macro Mechanism and the Micro Mechanism, specifically the BDI Model.

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From the Macro to the Micro - Herding, Clustering and Cascading

In general, sociological explanations are usually subsumed mixed up under psychological explanations. To disentangle the effects of sociological factors from psychological factors, a separate category or taxonomy is needed. Thus, we define **herding** which is commonly thought of as comprising of both psychological and social factors as being more psychological. As was previously discussed in Chapter 2: Literature Review (pages 35-36) this is the view under the taxonomy of Hirshleifer and Teoh (2003: 27) and elaborated further in Schulmeister (2006: 220).

In short, this nuanced view sees herding as having more psychological underpinnings since the **convergence of behaviour** is a result of using **models that generate similar signals** and the resulting panic in a crisis is **'fear'** just as **'greed'** is present in market upswings due to momentum trading strategies. Under this definition of herding, actors overreact and underreact to market conditions.

In contrast, **clustering** is more social since the emphasis is on an external factor (institutional), the trading systems. 'Clustering' has more social - institutional connotations. Using the definition of Hirshleifer and Teoh (2003: 27) **clustering gives emphasis to the technical trading systems which represent the external factor**. As stated, *'...people act in a similar way owing to the parallel independent influence of a common external factor.'* This is **not an interaction among people**. If FX markets cluster as stated by Schulmeister (2006), then a framework based on social aspects becomes more viable for financial markets.

Thus, the concept of **'herding'** which is anchored more in psychological processes implies that 'psychological biases' transcend to the societal level in a systematic and broad manner. If psychological biases are systematic/broad and transcend to the societal level, then the EMH along with behavioral finance (to account for the anomalies) would be enough.

However, if psychological biases are not systematic/broad and thus do not transcend to the societal level, then a social construct is more appropriate. Therefore**, clustering** might be the more common process under most market conditions. Additionally, many strategies today utilize some type of formal models. A prime example is quantitative funds. The technical analysis discourse is embedded in these formal

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models. In markets such as currencies and commodities, technical analysis techniques are commonly used.

However, that does not mean that **'herding'** can be simply put into the psychological process category since it **also has a social aspect**. In terms of the BDI Model in the Micro-Level Mechanism, herding impacts Beliefs and Desires. **A good example of the social aspect of herding is when investors follow gurus.** Hirshleifer and Teoh (2003: 25) state, *'For example, it is reported as news when Warren Buffet buys a stock or commodity, and this news affects its price ...Such influence may be entirely rational...'* This is similar to the view taken by Calvo and Mendoza (2000) regarding 'rational herding' in their model of contagion and herding.

In contrast, 'irrational herding' is also present in markets. Hirshleifer and Teoh (2003: 26) discuss the idea of 'irrational herding' in markets as follows: irrational herding in their definition means price movements that are unsupported by news or facts such the rise of US technology stocks in the 1990s; corporate events such as takeovers moving in waves; and fads such as analysts hyping certain industries sectors.

In the BDI Model of the Micro-Level Mechanism**, herding can be seen a big effect on market actors (private investors and some institutional investors) who have a weak or non-existing discourse.** Thus, the Desires (D) and Beliefs (B) are easier to change. In contrast, a strong discourse, which was discussed extensively in Step 1 is predominant in almost all investment strategies. The fact that these investment strategies are institutionalized as in the Institutional (I) part of the BDI Model; it is **highly likely that institutionalization acts to minimize** the effects of herding on Desires (D) and Beliefs (B).

Next, we discuss **cascading** according to Hirshleifer and Teoh (2003: 27) states, *'Informational cascades...the observation of others (their actions, payoffs, or even conversation) is so informative that an individual's action does not depend on his own private signal.'* In short, imitation here occurs with certainty.

For our purposes, **cascading implies complete or almost complete failure of discourse**. This means that a very large trigger event is needed for market actors to **abandon their specific discourse under the Institutional (I) part of the BDI Model**. This is the case since Institutional (I) is the most difficult to change in the BDI

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Model. Thus, only certain triggers will have enough of an impact to change discourse of market actors that has been institutionalized.

Table 10 below provides a summary of the three Macro to Micro Disruption Processes.

Table 10: Summary of the Macro to Micro Disruption Processes		
Herding	**Clustering**	**Cascading**
Convergence of Behavior Actors believe they are thinking independently with proprietary models	**Acting in a Similar Way** Actors behave same due to a common external factor	**Break Down of Beliefs** Actors ignore private signals and follow others

Next, we show where in the DBI Model of the Micro-Level Mechanism the three processes (herding, clustering and cascading) linking macro to micro are likely to make an impact. Table 11 below provides the specific parts of the BDI Model where herding, clustering and cascading effects have the most influence.

Note that this can be a somewhat artificial division since overlap between the three macro to micro processes in the Disruption Mechanism can be expected.

Table 11: The BDI Model with Herding, Clustering and Cascading Effects		
Beliefs	**Desires**	**Institutional**
Cognitive Dissonance: *(Herding – psychological)* **'Wolf Pack' Behavior:** *(Herding – sociological)*	**Type I: Action:** (Herding – *Psychological)* **Type II: Conformist:** *(Herding – sociological)* **Type III: Opportunities:** *Clustering and Cascading*	**Static and Dynamic** *Clustering and Cascading* Type I: Pseudo -Arb Type II: Market Makers Type III: Small Alpha Type IV: Large Alpha

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Step 4: Psychological

After investor discourse is disrupted, herding and psychology plays a more prominent role**. Investors panic and start to redeem funds from their investments** – mutual funds, hedge funds. Mutual funds are first since they automatically fall with the market drop. Hedge funds are delayed due to the redemption schedule – every quarter.

This stage is closest to the behavioral finance discourse and psychological explanations. The key point here is that what drives the market at this stage is not the institutional money managers, but the **investors themselves**. In essence, **investors can vote 'with their feet' through withdrawals and later on when the market settles with re-investments**. During the 2007-2008 Credit Crunch, this played a significant role when investors exercised their right to redeem funds from hedge funds on the redemption dates every quarter.

When the next investment flow cycle begins, **investors are also influenced by herding and psychological factors and many invest in the latest fad or hottest investment concept at the time**. This is where re-investments into strategies occurs. It should be noted that investors could now favor new strategies or distribute their funds differently than in the previous investment cycle.

The **behavioral finance literature on actor rationality and over/under reaction is especially relevant in this stage**. For example, overconfidence is particularly relevant in the new re-investment cycle and just before a market crash. Regarding overconfidence there are several key studies. Fischhoff, Slovic and Lichtenstein (1977) show that overconfidence exists while Ross (1987) provides a psychological explantion as to why overconfidence occurs. However, overconfidence does not necessarily lead to over-reaction or under-raction. Shiller (1979, 1981a,b) and LeRoy and Porter (1981) provide statistical evidence of general market overreaction and this evidence questions the validity of the efficient market hypothesis. The key studies in the behavioral finance literature are shown below.

Behavioural finance assumes that market participants are not rational (psychological, prospect theory explanations). Studies by Tversky & Kahneman (1974, 1981, 1986), Kahneman & Tversky (1979), De Bondt & Thaler (1985, 1987), Miller (1977), Russel & Thaler (1985), Cipriani & Guarino (2003), Barberis & Thaler (2003), Neiderhoffer

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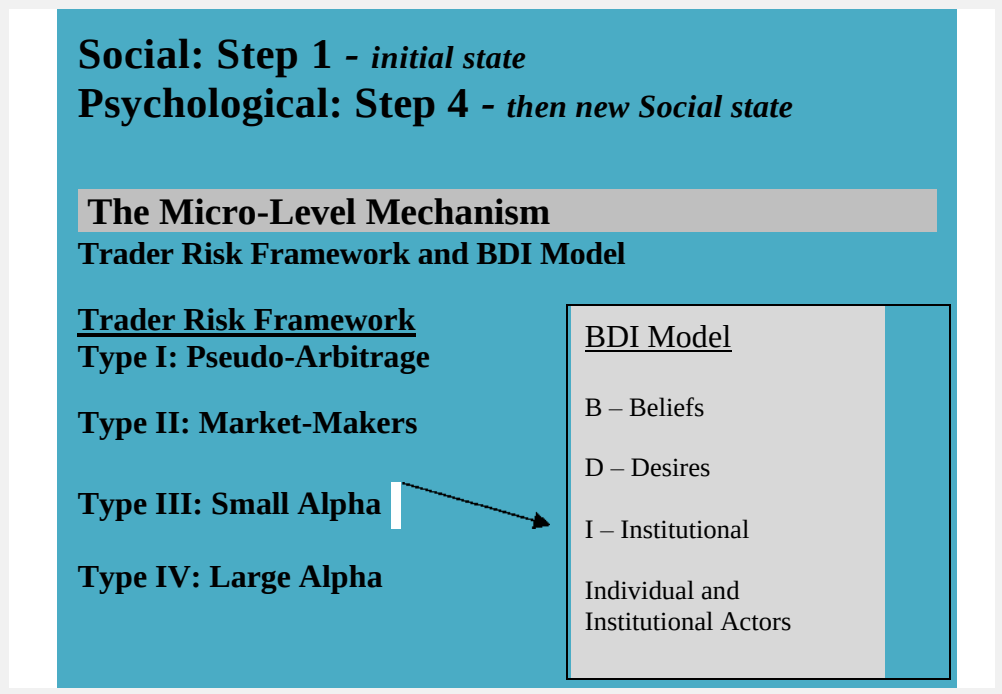
(1971) and Shiller (1997) provide evidence to support this view. In short, Psychological explanations, or more precisely behavioural finance explanations, relax the rational actor assumption that was at the heart of the RE/EMH explanations. The actors are now classified as 'irrational' or having 'bounded rationality'. This is more realistic, but it also makes mathematical analysis messier.

As shown graphically below from the bottom part of Diagram 8 below, **individual actors at this point, due to psychological biases** – mostly fear, directly impact assets under management of the various strategies.

Diagram 8: Psychological – Step 4 of the STDP Theory



One of the most popular accounts of financial crises in the psychological camp is by Kindleberger (1996), titled Manias Panics and Crashes. The methodology taken by Kindleberger (1996) is from an economic historical approach. The main assumptions of rationality found in economics are not the same as taken by Kindleberger. In short, Kindleberger (1996: xvi) according to Bernstein, relaxes the 'rationality' assumption, provides a model (but not in the mathematical sense) and stresses the **ambiguous nature of decision-making** during times of crises.

An important point made by Kindleberger and Aliber (2005) is that **'irrationality' begins in the valuation of a new opportunity and a crash occurs when market**

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participants realize their mistaken valuations. What is important here is the **implied cause of the over valuations** in the first place. If the opportunity is very new, it means that establishing a value is difficult since market participants have little historical data to rely upon. To see how the Kindleberger and Aliber (2005) process might fit in with Step 4: Psychological we need to see how this psychology-oriented crisis theory might fit with the STDP Theory that places a greater emphasis on the sociological/political aspects of financial crises.

Thus, after a certain point, **retail, high net worth individuals (HNWI) and institutional investors panic (fear)** and withdraw funds from the market. However, this certain point is always after **the social since institutional managers are the main actors** before the withdrawals. Finally, at that start of new cycle, greed kicks in and these same actors pile back into the market. If the process happens in this way, then process put forth by Kindleberger and Aliber (2005) is compatible with Step 4 of the STDP Theory. This is seen below:

1. The process begins by a **breakdown of the institutional managers**. In the STDP theory this is a result of the Macro to Micro Disruption Model through **cascading**. Institutional actors have a strong discourse and legal/institutional constraints as discussed in Step 1: Social. This is predominant in almost all investment strategies. Thus, in the Modified DBO model, **Opportunities(O) is institutionalized** and counters the effects of herding on Desires and Beliefs.
2. Next, panic and psychological processes set in when investors withdraw funds. In the Modified DBO Model of the Micro-Level Mechanism, herding can be seen as affecting market actors (private investors and some institutional investors) who have a **weak or non-existing discourse**. Thus Desires (D) and Beliefs (B) are easier to change.
3. Finally, **psychological factors play an important role in new investments** since investors are looking for new business breakthroughs and technological advances. Many of these investments are difficult to value since they are growth stocks with less certain business models. Retail investors would flock back into the market buying high-growth stocks whereas HNWI would also flow into venture capital investments involving emerging technologies.

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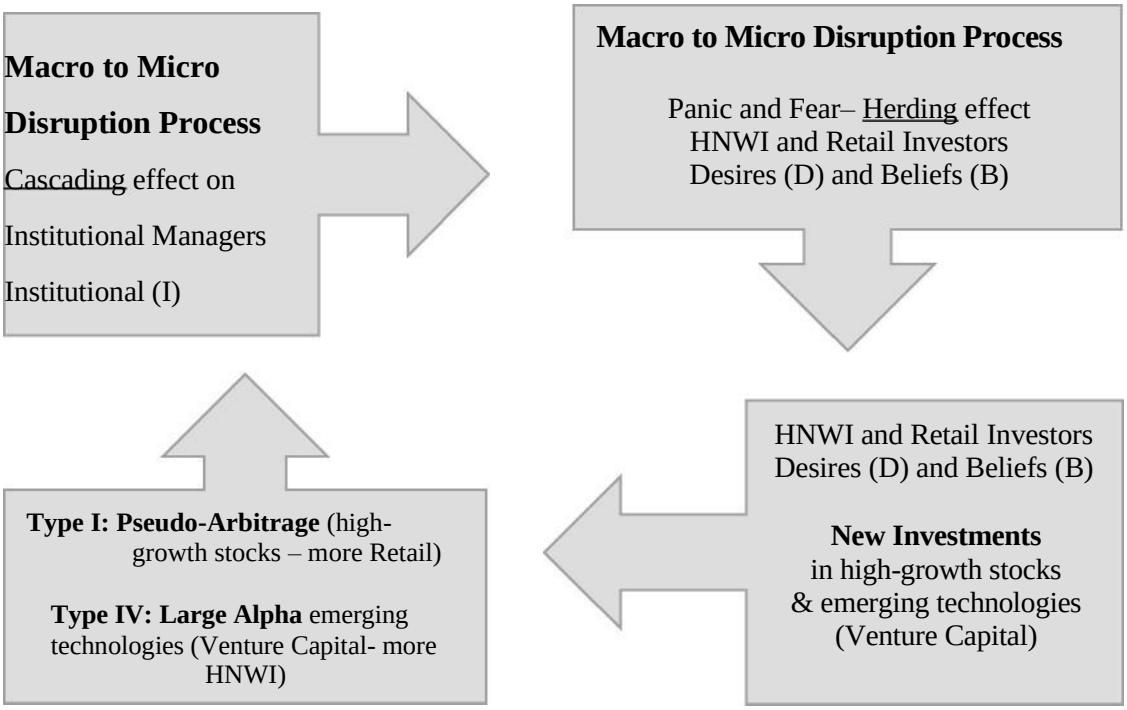
Diagram 9: Flow of the Psychological Process during a Crisis



Moreover, **when uncertainty is high, fundamental and technical analysis strategies converge**. Fear overtakes the market, thus the downward spiral in prices. Concepts such as **diversification fail** because **correlation among asset classes approaches one**. The same priciples are at work during bull markets, when prices rise well above what the market believes prices should be according to 'instrinsic' value. Thus, money managers, who rely on valuations and follow a value investment strategy are forced to keep on investing since if they don't, their competition will have better returns. The fear is that in the short-run, this will lead to funds flowing to competitors. Thus, a convergence of stratagies occurs in this stage of the process.

Although not stated explicitly, the valuation of new opportunities could rely on the social construction of prices. And since the opportunity is new, the social construction of its value is ambiguous in the beginning. It takes time for the market to come to an acceptable socially constructed value and when the market realizes the overvaluation mistake, a crash occurs. A classic example of this is the Dot.com Bubble of 2001.

In addition, it should be noted that learning occurs among market actors and policymakers. Learning from one crisis could result in a new regulatory environment as policymakers respond. In addition, the market actors could respond by going after

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new investment opportunities using different investment vehicles in order to entice investors. The result ends up as a new institutional landscape with shifting power among different various market actors providing investment vehicles (some of which are new or gain popularity after the crisis) to investors.

Part II: The STDP Crisis Magnitude Framework

In addition, a preliminary framework for a crisis magnitude framework for classifying crises based on the 4-step process in The STDP Theory of Financial Crises is proposed. Then using this preliminary framework, we could define crises as follows: Major-Global, Major-Regional, Minor-Regional or Country-Specific and Minor. Let's start with a crisis magnitude framework to specify the severity of a financial crisis and then to formulate a definition.

The first question we need to ask is how many crisis severity levels to have within the crisis magnitude framework. This depends on the amount of detail or nuance we want to incorporate. At this stage, it would be better to propose a simple framework with the expectation of future refinements.

The crisis magnitude and the comparison of crisis are based on the process of how a crisis unfolds using the 4-step process model The STDP Theory of Financial Crises. Note that **this approach of comparing the unfolding or process of crises is different than the comparability of crises common in the academic literature**. Thus, the following 4-level crisis magnitude framework and definitions are:

1. Global Crisis (Level 4)
2. Major Regional Crisis (Level 3)
3. Regional or Country-Specific Crisis (Level 2)
4. Minor Crisis (Level 1)

The definition of a **Global Crisis** is a severe crisis that affects most countries or economic zones on a global basis. Uncertainty is at the highest level arising from policy indecision and responses in a very uncertain environment. Market disruption is at the highest level with market actors giving up since most trading strategies do

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not work in this trading environment. Representative Global Crises include only two examples, the Credit Crunch/Euro Crisis Contagion Period (illustrated under Case Study 1) and The Great Depression of 1929.

Global Crisis (Level 4)

1. Severe crisis affecting the majority of the countries or economic zones.
2. Four out of the five triggers must be present in the modern financial era.
3. All three Macro to Micro-disruption processes must occur. The threshold for 'uncertainty' arising from MPE triggers must be so high that cascading occurs in the macro-to-micro disruption processes.
4. It is not only the number of MPE triggers but also the severity of those triggers that is important.

The definition of a **Major Regional Crisis** is a severe crisis affecting specific countries or economic zones. The confidence of market actors is affected to a large extent. Market disruption is at a high level with the majority of market actors experiencing disruption in their trading strategies. Representative Major Regional Crises include the Japanese & Asian Crisis Contagion Period (illustrated under Case 2), The Mexican 1982 Crisis and Latin America Debt Crises of 1980s Contagion Period.

Major Regional Crisis (Level 3)

1. Severe crisis affecting specific countries or economic zone(s).
2. Four out of the five triggers must be present in the modern financial era.
3. Two Macro to Micro-disruption processes must occur. The threshold for 'uncertainty' arising from MPE triggers is not large enough to cause cascading in a major way.
4. There must be MPE Triggers, but the Politics-Specific Triggers are significant such that 'confidence' overshadows 'uncertainty.'

Definition of a **Minor-Regional or Country-Specific Crisis** is one that affects a specific country or a region but in a minor way. Note it can be a severe or average crisis, it is just that somehow through the right combination of policies or other factors it does not escalate. Crises in the Geo-Political Resolution Crises Group fall under

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this category since geopolitical considerations prevent these crises from escalating. Representative Minor-Regional or Country-Specific Crises include the Mexican Peso Crisis of 1994 (Geo-Political Resolution Crises Group) and other similar crises that are resolved quickly based on geo-political considerations such as the Russian Crisis of 1998 and the Brazilian Crisis of 1998.

Regional or Country-Specific Crisis (Level 2)

1. Crisis affecting one specific country or an economic zone potentially.
2. Two out of the five triggers must be present.
3. One Macro to Micro-disruption processes must occur. The threshold for 'uncertainty' arising from MPE triggers is not large enough to cause cascading in a major way.
4. If a **Geo-Political Trigger** under MPE then the crisis is usually kept from escalating to a Major Regional Crisis (Level 3) or worst.

Definition of a **Minor Crisis** mostly affects one specific sector, asset class or just one country. The market actors are just a small or specific group and the asset class is specific, thus the damage can be contained and does not greatly affect the economy. Representative Minor Crises include the Quant Crisis of August 2007 (covered in Case 1) and the Dot.Com Bubble.

Minor Crisis (Level 1)

1. Crisis affecting one specific sector or asset class or country.
2. One out of the five triggers must be present.
3. One Macro to Micro-disruption processes must occur. The threshold for 'uncertainty' arising from MPE triggers is not large enough to cause cascading in a major way.

Finally, it should be noted that these rules are flexible especially for historical financial crisis since the context is different.

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Chapter 6: Case Studies

A brief overview of the three case studies will be provided. Then process-tracing methods are used to make within-case inferences then comparison between the cases is made on how the process unfolds.

Case Study Overview

Case studies will be used to illustrate the **applicability or 'fit' of The STDP Theory of Financial Crises** to various financial crises in different time periods. It should be stressed that the case studies in this section are for illustrative purposes. They are kept short in order to allow for the study of a greater number of crises and to focus on **testing using process-tracing methods.** In short, our goal here is to gain confidence in the STDP Theory as a crisis explanation framework by looking at **how temporal processes unfold**. In the future, further research can be conducted under each case study to gain a more in-depth picture or to look at other aspects.

Crises are covered as a single case or as a related major crises group. For example, the 1997 Asian Financial Crisis is related to The Russian Debt Default of 1998 and Long-Term Capital Management (1998). It should be noted that our look at crises case studies departs from the normal approach of looking at each crisis as an independent event. Instead, our view is that **contagion** is a critical part of how a crisis unfolds. The large-N approach to studying crises separated individual crises from the historical context. When a major crisis breaks out, a good analogy to use here is a major earthquake which is followed by minor tremors.

Thus, our approach emphasizes the close connection or strong effect of contagion among these crises. As part of the unfolding of a crisis, other crises are ignited. A benefit to this approach is that the crises are better placed within an appropriate historical context - social, institutional and political. Under each case, we also briefly examine the historical regulatory framework focusing on the changing role of the IMF and other key players and institutions in mitigating financial crises. Thus, we group the two major crises of the modern financial era (the onset of derivatives and hedge funds) into two major contagion periods as follows:

- **Case Study 1**: includes three crises – The 2007-2008 Credit Crunch, Quant Crisis of 2007 and the Euro Crisis of 2010.

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- **Case Study 2**: includes 4 crises – Japanese Crisis of 1995, The Asian Financial Crisis of 1997, The Russian Debt Default of 1998 and Long-Term Capital Management (1998).

Trading strategies develop over time and the market actors who epitomize these strategies change in importance over time depending on the needs of the main investor groups – institutional and retail. We show the importance of the various market actors under each case study and briefly note if technology or learning changed things.

The STDP Theory of Financial Crises can also help to understand and explain financial crises where geopolitical concerns are critical to the outcome. We term such crises as falling under the **Geo-Political Resolution Crises Group**. The Russian Debt Default of 1998 is an example of this type of crisis and is covered under the second case study. The third case study covers The Mexican Peso Crisis below:

- **Case Study 3**: examines crises where geopolitical concerns are paramount. Here we look at The Mexican Peso Crisis of 1994 (critical country to the US), thus financial aid and resolution of the crisis happened very quickly.

Case Study 1 is the **base case** and the **most complete and detailed study** since we cover the process for all **three mechanisms –** macro, disruption and micro. Regarding **cases 2 and 3, we covered only two mechanisms** – macro and disruption. The focus in these cases was on the 4-step macro-mechanism with the goal of generalization. Justification of this approach is provided under Chapter 3: Methodology.

Finally, it is important to mention learning and regulations again. These **two areas are touched upon but not covered in depth**. The biggest changes occur after a crisis ends and right before the start of a new one. The STDP Theory allows us to envision and incorporate these two important dimensions under in Step 4: Psychology. The last step right after the market is disrupted and a new social state begins.

The STDP Theory can incorporate learning by policy-makers for example. During the 2007-08 Crisis, policy-makers were nervous that a Japanese-style deflation would take hold and acted with strong decisiveness. In contrast, the Europeans did not learn these lessons and initially failed to apply the same decisiveness resulting in the Euro crisis spiralling out of control. Of course, policy-making in Europe is much more complex. Large policy errors were also made in the US when Lehman collapsed.

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Case Study 1:
STDP Theory & the Credit Crunch/Euro Crisis Contagion Period

Abstract

The STDP Theory of Financial Crises provides a unique perspective on our understanding and explanation of the 2007-08 Credit Crunch & Euro Crisis period. A case study approach utilizing process tracing methods highlights how all three mechanisms (macro, disruption and micro) of The STDP Theory can be applied towards uncovering the process of how a major crisis unfolds.

Key Words: Financial Crisis, Crisis Theory, Process Tracing, Case Study

Brief Overview of the Main Crises in the Case Study

This study encompasses three main crises that occurred as a result of the 2007-2008 Credit Crunch. Instead of prevailing literature that looks at these crises as separate events, the approach taken here is to view this period as one crisis. Thus, the use of the term - **crisis contagion period**. Thus, the crisis contagion period of 2007-2012 includes the Credit Crunch, the Quant Crisis of 2007 and the Euro Crisis of 2010.

The 2007-2008 Credit Crunch was the most significant crisis since the Great Depression. In terms of the STDP Theory, this crisis is seen as best representing the modern era thus the actors align very closely to those in the STDP Theory. Since this was a major crisis, the triggers for the crisis are expected to be quite broad thus a good test for the fit of the model. This crisis represents and extreme example since all the triggers in the STDP Theory occurred. Under our Crisis Magnitude Framework, this would be classified as a **Global Crisis (Level 4)**, same as the Great Depression.

In the STDP Theory, the Quant Crisis of 2007 provides an interesting mini-case study on the **super-portfolio trigger**. This crisis lasted for only 3-days in the summer of 2007, but it was a 27 standard deviation event in the ‘quant’ hedge fund world. Many so-called ‘quant’ funds went out of business. This is also a good case to compare to the Long-Term Capital Management crisis of 1998.

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This crisis period ends with another major crisis - the Euro Crisis of 2010. The underlying reason was a flawed currency that was exposed as the world economies plummeted as a result of the US crisis. The Euro was created and maintained for political reasons but diverging fiscal and monetary policies led to stress in the system. In addition, this could have turned into a sovereign default crisis of major proportions but coordinated action with the US prevented this from getting worse.

From a political perspective, what is interesting is how Europe responded compared to the US during both the Credit Crunch of 2007-2008 and the Mexican Peso Crisis of 1994. For example, during the Mexican crisis the US takes on a similar role as Germany during the Euro Crisis. In contrast, the US acted more quickly to prevent escalation of the crisis, something that Germany and Europe failed during the start of the Euro Crisis of 2010. The more complicated policy environment of Europe probably played an important role in the weak initial policy response.

Explanations of the 2007-08 Credit Crunch

Next, we provide a look at explanations of the 2007-08 Credit Crunch. This is the **key case during this crisis period** thus a more in-depth look is warranted. Kolb (2011) provides a comprehensive overview and makes the important point that **no single cause** was responsible for a financial crisis that was of a similar kind to the Great Depression. We also take a similar view and any explanation of the 07-08 crisis would be subject to the concept of **'equifinity'** or the idea that **multiple explanations or paths** could reach the same outcome This is appropriate for such a major crisis due to the complexity arising from the interaction of numerous factors.

For Kolb (2011) one of the most critical causes was the change from an originate-to-hold to an originate-to-distribute model in the way mortgages were financed. The perverse incentive created in the housing industry resulted in a host of participants pursuing narrow interests resulting in disaster. The process started with borrowers and mortgage brokers and with a host of actors in the middle such as rating agencies and ended with investors and government policymakers.

This explanation begins at the **micro-level** with a discussion of how the **originate-to-hold model of mortgages** meant that the banks would evaluate home buyer

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mortgages and hold the loan on their books for the whole time period, up to 30 years. Then **public policy** wanted to **increase home ownership**, thus the shift to the **originate-to-distribute model**. Here loans were originated by the lenders and immediately sold to financial institutions that **securitized the loan**. These would then be sold to investors worldwide. This process spread to include lower quality loans called **subprime and Alt-A**. Models were created to estimate the default rate of these loans and risk was mitigated through securitization. Problem was the models and the process were **based on optimistic assumptions on default rates** that were in any case difficult to estimate. This eventually led to the complete disappearance of several key intermediaries and mortgage lenders – Countrywide Financial, Indy-Mac, Wachovia National Bank and Washington Mutual. In addition, major money-center banks like Citigroup were wounded and would take years to recover. Two of the five largest investment banks – Lehman Brothers and Bear Stearns – went completely out of business.

Macro-level factors also played a key role according to Kolb (2011). These include **excess stimulus** as a result of the dot com bubble that led to **very low interest rates**, a savings glut in Asian countries that provided **excess liquidity** in the U.S., home expansion policy biases, failure of prudential regulation on financial institutions.

Kolb (2011) notes additional factors at the macro-level, such as the **response** of the U.S. government towards the crisis. The regulatory regime become more invasive and money was provided for major players, in effect changing investment banking. Merrill Lynch was taken over by Bank of America and government assistance created zombie banks such as Fannie Mae, Freddie Mac along with AIG and Citigroup. At the micro-level: financial innovation, poor risk management, corporate governance and excess leverage also played a role in the crisis.

Kawai, Lamberte and Park (2012: 6-9) note **four major contributing causes** to the 2007-08 crisis. These were: easy monetary policy; regulatory failures at the macro and micro-level; global imbalances in savings and excess inflows to US; and a weak international financial architecture that failed to keep pace with financial innovation. However, they see the **roots of the crisis in the US housing bubble**, specifically the subprime market.

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Wyplosz in Kawai et al. (2012: 7) also notes that the transmission of the crisis to Europe was fueled by **housing bubbles in many European countries** plus **divergences inflation rates under same interest rate** of the Eurozone. *'As a result, countries with higher inflation rates faced lower real interest rates, thereby fueling active housing markets, property development, and foreign lending.'*

Next, a comparison of **four business cycle explanation frameworks** regarding the 2007-08 credit crunch is provided by Hendrickson (2013: 151-196). Her approach looks at the similarities and differences of explanations from Minsky, Kindleberger, Garrison and Mishkin. **All four explanations agree that investment spending** driven by an increasing reliance on debt leads to asset price inflation. Thus, there is a critical role played by credit in the crisis. When this investment-credit-rising prices loop is interrupted, then asset prices and credit are reduced. There are some social assumptions embedded in this explanation although they are not emphasized. Hendrickson (2013: 152) states, *'However, the rising prices cannot continue indefinitely, so, at some point, there is a realization that prices will not continue to rise.'*

The **differences arise in five main areas** according to Hendrickson (2013). These are the **trigger**, role of **knowledge**, role of **interest rates**, **turning point** and the role of **monetary policy**. Regarding the trigger, both Minsky and Mishkin see the crisis starting within the financial system (endogenous). Mishkin also blames interest rates and asymmetric information. Kindleberger and Garrison on the other hand, see the trigger as an exogenous shock emanating from securitization of lower credit quality subprime and Alt A mortgages to expansionary monetary policy respectively. For Kindleberger the cause is generally an innovation, in this case in the mortgage market, that sparks a speculative fervor.

In short, most of these explanation frameworks are focused on **micro explanations** at the agent level. The main causes are the financial system and asymmetric information. In addition, the uncertainty in investing in new opportunities (Kindleberger) and loose monetary conditions (Garrison) contributed to the crisis.

Groton (2012) for example places the blame of most financial crises squarely on micro-level causes. He views most crises prior to 1970 as banking crises, about 62%, with associated bank runs. He also sees the 2007-2008 financial crisis as a bank run,

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but in this case, it was **firms running from investment banks**. For Groton (2012), underlying all financial crises is an **exit from bank debt** or a bank run. He states that this is an inherent problem in market economies. In short, banks do not have sufficient cash to honor all their debt claims during a financial crisis.

An interesting point made by Groton (2012) was the **intellectual failure of the economic profession**. He blames the myopic vision of the profession that became used to a short-term history of no banking panics in the US and assumed that well-designed bank regulations prevented banking panics would continue forever. Thus, their **models ignored financial intermediation** because they thought it was irrelevant. It was not, they should have had a longer-term frame of reference.

This same **criticism on the economic profession** is echoed by Krugman (2011: 309) who states that although the Diamond-Dybvig (1983) does not model what went on during the 07-08 crisis perfectly, it was still value in showing how bank runs occur. He states, *'And I'm afraid that the way many economists read the paper was an essay in economic history, a description of what could go wrong in the bad old days.'*

However, we should also question the view of Groton (2012) whether banks are the causes or symptoms of financial crises? A difficult to answer question, but we should keep it in mind when looking for the underlying causes of financial crises otherwise we regress into a narrow reductionist explanation. Politics and regulations could play a bigger role than is commonly assumed in the academic community.

In short, the 2007-08 Credit Crunch was a **complex crisis** that was caused by a **combination of macro and micro-level** factors. Thus, multiple explanations or paths are possible. The presence of 'Equifinity' means that some of the explanations offered earlier along with others could potential fit within the explanation of the 2007-08 Credit Crunch offered by the SDTP Theory of Financial Crises.

Next, we will look at the process tracing test as applied to this crisis period and then present the details of the case study.

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Supporting Case Study and Process Tracing Tests

A brief overview of the process tracing tests is provided here for the convenience of the reader. For a more detailed discussion please refer to Chapter 3. Three of the four process tracings tests are in order of strength from Hoop (certain, but not unique), Smoking-Gun (unique but not certain) to Doubly Decisive (both unique and certain). The Straw in the Wind Test is just circumstantial evidence and thus neither unique or certain. Types of evidence, these are categorized as: Pattern (statistical), Sequence (temporal processes), Trace (exists or not) and Account (context of the evidence).

A rough visualization on how the Credit Crunch/Euro Crisis Contagion Period unfolds under the STDP Theory of Financial Crises is shown in Diagram 10 (page 144). This is meant as an aid to help the reader better understand the crisis using the 4-step process of the STDP Theory. The size of the factors is a very rough estimate by the author.

Mechanism Tests – Macro, Disruption and Micro

The temporal processes of the Credit Crunch/Euro Crisis Period can be explained by the STDP Theory of Financial Crises. The evidence here passes the **Smoking-Gun Test** since this is a unique explanation but not certain.

Type of evidence provided is **Sequence** regarding the Macro Mechanism (Social, Trigger, Disruption and Psychological), Disruption Mechanism and the Micro Mechanism. The STDP Theory provides a logically consistent explanation of how the crisis unfolds through all three mechanisms.

Trace evidence is present especially in the Trigger stage. As can be seen in Diagram 10 (page 144), Step 2: Trigger for this crisis period is very broad covering **all five trigger mechanisms** in the STDP Theory. The most critical trigger is the Macro-Policy Environment (MPE) since this results in uncertainty. In this crisis, there were **four key MPE trigger events** with some being very severe such as when US policy makers let Lehman collapse.

All three macro to micro processes affects the market actors as shown in Diagram 10 (page 144), Step 3: Disruption Mechanism. However, the biggest circle is **Cascading** as a result of **huge uncertainty** from the 4 MPE Triggers. This shows a complete breakdown of trader beliefs in their models/trading strategy due to the huge

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uncertainty and volatility created during this crisis period. Thus, in terms of sequence, the process connects the macro to the micro and shows that Cascading played the biggest role in disrupting the actors at the micro-level.

In addition**, account evidence** is present since the **context of the evidence** provides a reasonably good explanation that is broader based than other explanations. When comparing the process through the 4-steps of the STDP Theory with other crises, the severity and the complexity of the Credit Crunch/Euro Contagion Period is visually evident by looking at Diagram 10 (page 144). For example, the STDP Theory captures macro factors – processes at the macro or sequence (step-level) and micro factors – processes at the agent/social level at a good level of depth. In addition, the STDP Theory provides a complete explanation of this crisis period from macro to micro and back to macro again.

Individual steps of the 4-step process theory measure up differently on the process tracing tests. Step 1: Social is very close to passing the **Doubly Decisive Test** since the actor breakdown during this crisis period is much closer to reality than competing explanations. This is certainly unique and very close to being certain, thus this part of the model is certainly at the Smoking Gun Test level but closer to the Doubly Decisive Test level. On the other hand, Step 4: Psychology just passes the **Hoop Test** since this part is not unique. In between sit Step 2: Trigger and Step 3: Disruption, both these steps provide a unique explanation, but not certain as other explanations are available, thus they can be considered at the **Smoking-Gun Test** level.

Finally, the Micro-Level Mechanism passes the **Smoking-Gun Test** level since this is unique but not certain since other micro-level mechanisms are available and possible. The Micro-Level Mechanism contains two sections – the Trader Risk Framework and the BDI Model. This is certainly unique with depth. However, it might be too complex and cumbersome. On the other hand, oversimplification such as in the EMH becomes divorced from reality since rationality is assumed thus crises under this explanation require a heavy dose of ‘irrational’ actors and the use behavioral finance as a plug. In short, we are left in the middle, thus further research on making the micro-level mechanism simpler would be desirable.

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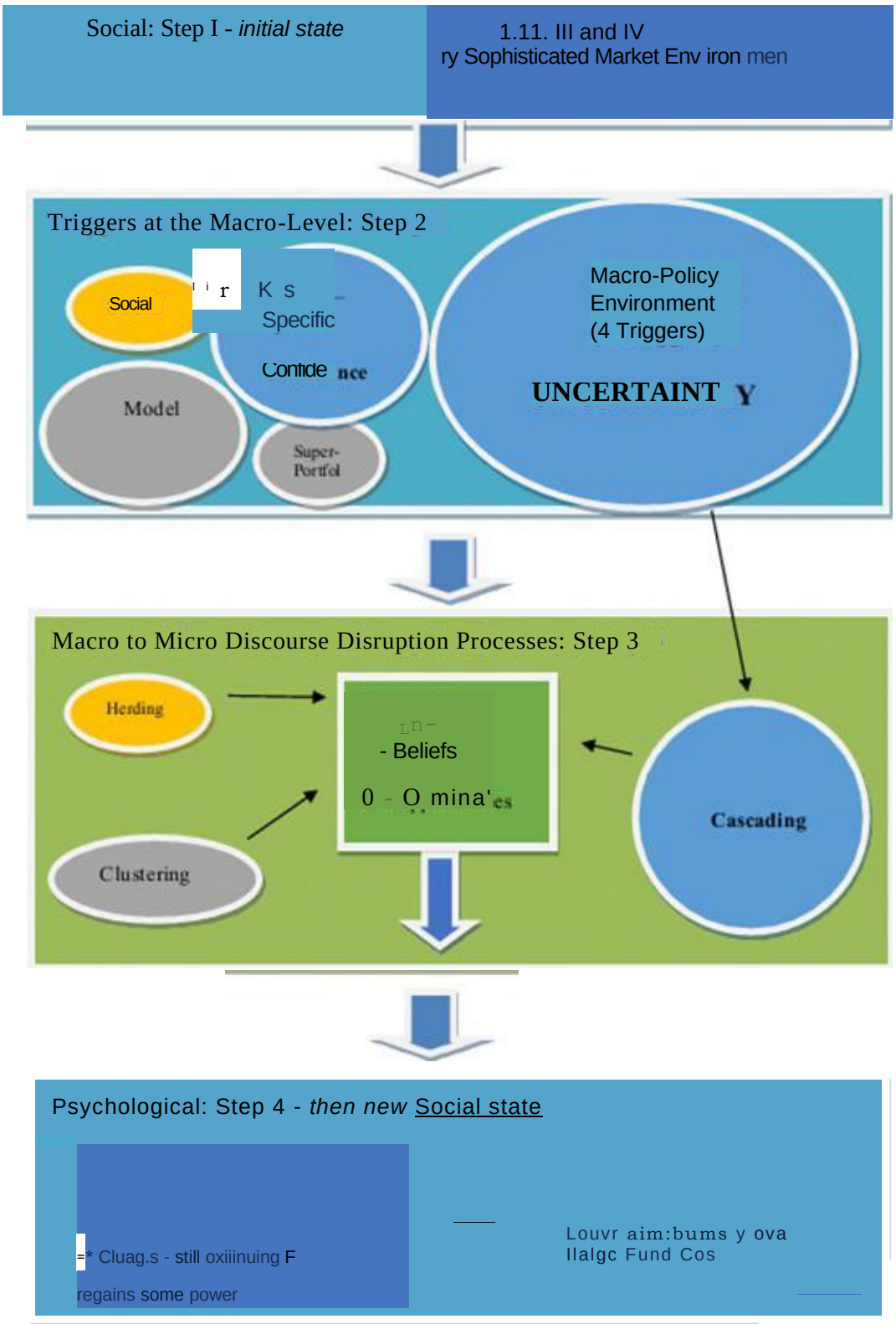
Diagram 10: STDP Theory and the Credit Crunch/Euro Contagion Period



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Step 1: Social

The market actors prior to the start of the crisis would resemble the ones shown in Table 12 below that would constitute the market structure during the modern period of finance. The key actors in this crisis fall under **Type II: Market Makers**. This category includes the main actors of banks, investment banks and mortgage lenders that were affected the most during the crisis. In addition, high-frequency trading hedge funds suffered during the Quant Crisis of August 2007.

Table 12: Market Actors during Credit Crunch/Euro Crisis Contagion Period

	Main Actors	**Sub-Actors**
Type I **Pseudo - Arbitrage**	**High Velocity Algorithmic Trading** **Fixed Income Arbitrage** *Euro Crisis (Spain, Greece, Italy, Ireland and Greece)* **Statistical Arbitrage, Equity Market Neutral, 130/30 Strategy** *Quant Crisis August 2007*	**Markowitz – Portfolio Diversification Strategies** Mutual Funds and Insurance Company Mutual Funds **Other Quantitative Strategies** Convertible Bond Arbitrage Capital Structure Arbitrage
Type II **Market-Makers**	**Banks and Mortgage Lenders** *Subprime and Alt-A mortgages* **Investment Banks** *Securitization Process* *Political Policy Decisions on Lehman, Bear Sterns, AIG, etc.*	Stock & Commodity Exchanges Prime Brokers of Investment Banks *Margin Requirements - Liquidity* Proprietary Trading Desks – Banks and Investment Banks *FX during Euro Crisis & Investment Bank Quant HFs – Quant Crisis*
Type III **Small Alpha**	**Long/Short Equity Hedge Funds** *Quant Crisis August 2007*	Mutual Funds – Active *Euro region or Eastern Europe Focus*
Type IV **Large Alpha**	**Opportunistic Hedge Fund Strategies** Global Macro Emerging Market Hedge Funds Sector-Focused and Emerging Market Long Short Equity Funds	**Event-Driven** Merger Arbitrage, Activist, Private Equity **Opportunistic** Venture Capital

In general, the structure of the market during the Credit Crunch/Euro Contagion Period was **very sophisticated** since quantitative funds were developed to a high degree. An important change in the hedge fund industry was that it became more institutionalized since the Asian Crisis, thus a shift away from the dominant strategy of global macro towards more quantitative strategies and long/short hedge funds. According to Sang (2009), in terms of daily trading volumes, High-Frequency

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Trading (HFT) firms accounted for almost 50% of all equity trading volume in 2007 and slightly more than 60% in 2008.

Brief Overview of the Regulatory Environment and IMF

The IMF, as a result of the backlash arising from the Asian Financial Crisis 1997-98, was sidelined and the system of global governance was decentralized. In this regulatory framework, market actors played a more critical role in the process. In short, the Asian Crisis had marginalized the IMF with the creation of the G20 and the Financial Stability Board (FSB). The IMF now operated in a regulatory environment where the policy idea of **market-led liberalization** was king. This meant weak market discipline, self- and light-touch regulation plus decentralized supervision. The **light-touch regulation** in place since the late 1990s, no doubt played a key role in loose market actor behavior that fed the bubble.

In addition, securitization was seen in a positive light. Moschella (2012: 122-123) states that the US Secretary Henry Paulson thought of securitization as positive since it gave credit to millions of citizens to buy homes. This was the conventional wisdom at the time.

Steps 2 & 3: Trigger and Discourse Disruption

The Credit Crunch/Euro Crisis was a unique event since it had multiple triggers and the impact of the crisis was felt throughout all four trader risk types in the Micro-Mechanism.

The **Macro-Policy Environment (MPE) triggers** during the Credit Crunch/Euro Contagion Period were **bigger** than during the Japanese & Asian Contagion Period. This meant that '**uncertainty'** was much higher. This uncertainty was also fueled by **model failure** in the **pricing of new financial products** that were based on difficult to estimate default rates in subprime and Alt-A mortgages. Thus, the **model trigger** also fed into uncertainty. Regarding the Euro Crisis, we can view it as causing one huge **Politics-Specific Trigger**. However due to the political capital invested in the Euro the risk of it breaking apart was probably lower than commonly thought in the market.

On the next page, Table 13 clearly shows the broad impact the crisis on the market.

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Table 13: Credit Crunch/Euro Crisis Contagion Period - Trigger Mechanisms, Macro to Micro Disruption Processes and Impact on Market Actors		
Trigger Mechanisms	**Macro to Micro Disruption Processes**	**Impact on Market Actors according to Trader Risk Framework**
Social Model Super-Portfolio Politics-Specific Macro-Policy Environment	Herding Clustering Cascading	Type I: Pseudo -Arb Type II: Market Makers Type III: Small Alpha Type IV: Large Alpha

Let's look at a timeline of the crisis with a focus on the trigger mechanism(s), the macro to micro Disruption Mechanism and the Micro Mechanism in conjunction with the specific market actors impacted.

Social Trigger

The run up in prices before the 2007-2008 Credit Crunch is similar to the **explanation** of crises found in Kindleberger (1996) and Kindleberger and Aliber (2005) discussed in Chapter 2 and 3 (pages 23-24 and 129-131). This is a **real estate bubble** rather than the high-tech bubble of Dot.com, but the processes would be similar. Of course, the magnitude and the bursting of the bubble had a much greater impact on investors. Thus, the start of crisis arose due to a Social Trigger in the STDP Theory.

Taylor (2009: 1-3) states that the build-up of asset prices in real estate and in the stock market represent a **normal boom-bust cycle caused by excesses** – frequently monetary excesses. Federal Reserve monetary policy from 2000 to 2006 was very loose. Using the Taylor rule as a benchmark, he shows that monetary policy was too accommodative during this period. The Taylor rule provides guidance on how a central bank should adjust nominal interest rates depending on GDP output and inflation. If inflation goes up by one percentage point, then nominal interest rates need to increase by one percentage point or more. From 2003 to 2006, interest rates were way below what was stipulated by the Taylor rule.

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Even though the process is social, the underlying causes were a result of the **macro-policy environment**. Let's call this the first policy mistake – easy money. There was also a long-term policy that spanned decades. It was a political view in the US that made home ownership a priority. Thus, we have the first Macro-Policy Environment Trigger (**1st MPE Trigger**) directly affecting the Social Trigger.

BDI Model Processes: Herding played a major role especially in the real estate market. The run up in prices was fueled by excess speculation by mostly non-investment professionals – the public. In the stock market, the run up in prices was facilitated by professional money managers in the mutual fund industry. Their investment strategy is highly mechanical and in a bull market, mutual funds contribute to rising asset prices. Table 14 below illustrates the various processes at work in the build-up of asset prices before the 2007-2008 Credit Crunch.

Table 14: The BDI Model Processes under the Social Trigger during the 2007-2008 Credit Crunch

Beliefs	**Desires**	**Institutional**
Cognitive Dissonance: Public – Real Estate & Stock *(Herding – psychological)* **'Wolf Pack' Behavior:** Momentum Investors *(Herding – sociological)*	**Type I: Action:** Public – Real Estate & Stock Momentum Investors (Herding – *Psychological)* **Type II: Conformist:** Public – Real Estate & Stock Momentum Investors *(Herding – sociological)* **Type III: Opportunities:** Pseudo Arb (momentum) and Mutual Funds - passive *(Clustering)*	**Static and Dynamic** Type I: Pseudo Arb Momentum Strategies Mutual Funds - passive *(Clustering)*

Model Trigger

In the period prior to the crisis, the models used by the financial industry in valuing and estimating default on sub-prime mortgages were flawed. Taylor (2009: 12) states, *'...the rapidly rising housing prices and the resulting low delinquency rates likely threw the underwriting programs off track and misled many people. A significant amplification of these problems occurred because adjustable-rate sub-prime and*

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other mortgages were packed into mortgage-backed securities of great complexity.' The risk was underestimated by the rating agencies due to this complexity among other reasons.

Bhidé (2009: 212) under his section titled: The Effect of Make-Believe Models on the Real World, **places the blame on modern finance**. Essentially, the idea that uncertainty could be quantified (followers of Thomas Bayes) won out over the idea that uncertainty cannot be quantified (followers of Frank Knight and John Maynard Keynes).

In addition, Bhidé (2009: 213-214) **criticizes the concept of diversification**. He states that the risk is an unquantifiable uncertainty, thus subjective judgement was needed by bankers. A holistic approach relying on relevant precedents, due diligence and relationships with the borrower was more prudent, otherwise known as case-by-case investing. He believes that it is **delusional to rely on diversification** based on probability distributions and if everyone is doing the same then it can't work, and this is just free riding.

Brigo et al (2010: xvi-xvii) state that once a **model is adopted** in an institution it becomes **integrated with lots of resources** especially in IT. It is institutionalized until a better model comes along but the benefit must then be greater than the cost to change since new resources will be needed to integrate the model in the institution.

Perhaps uncertainty cannot be quantified, however trading and risk systems require quantification. Thus, a fine line exists between what the models combined with market actor inputs show reality to be and what reality is during that moment. Models are always flawed and in certain market environments the flaws show up more. Therefore, the subjective inputs of human market actors are vital, especially in times of crises. Certain strategies are more prone to the Model Trigger. **Type I: Pseudo-Arbitrage** are the most susceptible and **Type II: Market Makers** to some extent.

This means that more fully systematic strategies and market maker trading activities relying extensively on risk systems **behave in a more 'mechanical' way**, thus they are caught off-guard when the trading environment changes rapidly. Case-by-case investing, the terminology from Bhidé (2009), describes Type IV Large Alpha and to a lesser extent Type III Small Alpha market players whom are either less prone to the

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Model Trigger or immune to it. The risk here is mainly indirect. The Model Trigger could cause price disruptions in certain trading instruments that are also held by Type IV and Type III market actors.

Model Trigger & Macro to Micro Processes on the Micro Mechanism: Since the model for the sub-prime securitization was institutionalized at banks and investment banks, **cascading** would have played a major role once the trigger occurred. In the initial development and institutionalization stage of the model, **herding both the psychological and social aspects** would have played a role. This would have taken place under the **Beliefs (B) and Desires (D) part of the BDI Model**. Under Desires (D), the market actors (Banks and Investment Banks) would have seen the financial innovation of securitization being applied to mortgages and they would have wanted to join in order to make profit (Type I: Action) and to copy the success of others (Type II: Conformist). As the securitization of mortgages became the norm, the Beliefs (B) part of the process would have strengthened the resolve and acceptance of the market actors in perpetuating this further. As discussed at the start of the case, the US Treasury Secretary and a member of the ECB board supported mortgage securitization, thus the Beliefs (B) part of the process was becoming broader or snowballing to market actors, investors and government officials. Once the model trigger occurred, **cascading** would have been the key disruption process by which the market participants abandoned their models under the **Institutional (I) part of the BDI Model**. This is shown in Table 15 below.

Table 15: The BDI Model Processes under the Model Trigger during the 2007-2008 Credit Crunch

Beliefs	Desires	Institutional
Cognitive Dissonance: Banks & Investment Banks *(Herding – psychological)* **'Wolf Pack' Behavior:** Investors - all types *(Herding – sociological)*	**Type I: Action:** Banks & Investment Banks *(Herding – psychological)* **Type II: Conformist:** Banks & Investment Banks *(Herding – sociological)* **Type III: Opportunities:** **Banks and Investment Banks *(Cascading)*** Numerous Investors and HFs	**Static and Dynamic** **Banks and Investment Banks *(Cascading)*** Numerous Investors and HFs

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Finally, it should be noted that the Model Trigger is present during both normal market environments and during times of financial distress. In most cases, it is a minor trigger with not too severe of an impact on the market. For example, in a normal business cycle, the market correction is not too severe, thus most of the strategies exposed to the Model Trigger suffer manageable losses and are able to quickly recalibrate their models. However, in times of financial distress, the models tend to produce a super-portfolio. That is, many quant strategies converge over time which results in a 'crowded' trade. This is explained in more detail in the next section.

Super-Portfolio Trigger

In order to better understand the the Super-Portfolio Trigger during the 2007-2008 Credit Crunch that resulted in the **'Quant' Crisis in August of 2007**, we first need to put this crisis in context. A similar crisis had occurred about 10 years earlier in August of 1998. This crisis was the Long-Term Capital Management (LTCM) of 1998 and is covered under Case Study 2: Japanese & Asian Financial Crisis Contagion Period.

MacKenzie (2005: 62-83), in his discussion to the LTCM crisis, provides a detailed account of how a **'super-portfolio' emerges**. MacKenzie (2005: 64) states, that market efficiency is achieved through arbitrage even when prices are affected by irrationality. In economics, arbitrage is vital for the *'performativity' of economics: the thesis that economics creates the phenomena it describes, rather than describing an already existing 'economy' (Callon 1998).* The success of arbitrageurs hinges on the extent that price discreptancies are eliminated, but to identify these the arbitrageur relies on finance theory, thus they '*render the theory perfomative: price patterns in the markets become as ascribed by the theory.'*

The LTCM crisis was caused by the creation of a 'super-portfolio' through **mimic strategies (imitation)**. The same process occurred during the 2007 'Quant' Crisis. Both these crises were caused by **Type I Psuedo-Arbitrage and Type II Market Actors** pursuing **psuedo-arbitrage strategies**.

Paradoxically, as discussed by MacKenzie (2005) earlier, the pursuit of small price discreptencies which brings prices towards an EMH ideal created these two crises – 'Quant' Crisis and LTCM. As more and more competitors enter the market to exploit

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arbitrage opportunities, profits fall. Thus, increased leverage is needed to maintain returns. Small price movements are now magnified and downside risk is increased.

Incorporating the idea of **'super-portfolio'** as expounded by MacKenzie (2005) into the **framework of the STDP Theory**, Type I Pseudo-Arbitrage and Type II Market Makers look for new businesses to enter where profit margins are larger, and this increases risk. Thus, paradoxically the quest towards and the EMH increases risk. Higher leverage is needed over time to maintain returns for investors. The trade becomes crowded (social) and a super-portfolio is created. Any shock that impinges on this EMH process exposes some Type I Pseudo-Arbitrage market players and Type II Market Makers to substantial losses and a crash is triggered.

Thus, the process of getting to an **effiecient market (EMH)** can be a cause of crises. This is a behaivoral (social) response since returns need to be maintained. Arbitrage strategies are low-profit supermarket 'nickle and dime' strategies thus as profits are squeezed by more 'copycats,' leverage and consequently risk are increased. To conclude, crises can be caused by the **'smart money'** or Arbs (language of RE/EMH discourse) who are seeking to eliminate market discreptancies towards the idea of creating an EMH.

Next, we examine what happened during the 'Quant' Crisis in August 2007. In the investment world, the problems were just surfacing. Lo (2008: 255) states, there was nervousness in the market due to the events of the U.S. subprime mortgage market, the **blow-up of two credit strategy funds** associated with the investment bank of Bear Sterns in June. Then in July, Sowood Capital Management experienced losses of greater than 50% (eventually sold to Citadel, a quant hedge fund). Finally, the credit and fixed income markets were in turmoil due to **poor results by Countrywide Financial**, major sub-prime lender, in the second and third quarters of 2007. It should be noted that the two Bear Sterns funds, Sowood Capital and Countrywide Financial were investing in subprime mortgages and/or credit instruments.

However, during a three-day period (6th, 7th and 8th of August), Lo (2008: 255 – 256) states, many famous quantitative strategy funds using long/short market neutral strategies known as statistical arbitrage strategies experienced severe problems. These funds were mostly beta neutral meaning they had little exposure to market movements. The strategies are discussed in Table 16 on the next page.

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Table 16: **Relevant Hedge Fund Categories during August 2007 Quant Crisis - Lo (2008)**
Statistical Arbitrage Highly technical short-term mean-reversion strategies involving hundreds of thousands of securities with very short holding periods. Substantial computational, trading and IT needed.
Quantitative Equity Market Neutral Broader types of quantitative models, some with lower turnover, securities and economic indicators.
Long/Short Equity The broadest category which includes any equity portfolio engaged in short-selling, maybe market neutral but often long bias and maybe quantitative and could include lots of IT or not. Largest HF category.
130/30 A HF or managed account category that for example, has 100 M under management. It uses leverage to keep 130 M in long positions of one set of securities and 30M in short positions of another set of securities. It is a natural extension of long-only funds.

According to Lo (2008: 256), the losses ranged from -5% to -30% for some of the best quant funds. For example, Renaissance Technologies probably the best quant fund lost 8.1% in August. The quant fund run by Goldman Sachs lost more than 30% in a week. '*David Viniar, chief financial officer of Goldman Sachs, argued that "We were seeing things that were 25-standard deviation moves, several days in a row."*

Lo (2008) looks into the possible reasons as to the causes of the August 2007 Quant Crisis. Essentially, he uses indirect evidence (since hedge fund data is notoriously unreliable) to gauge the profitability of the relevant hedge fund strategies for 10 years leading up to the event of August 2007. Additionally, a **simulation is conducted** to gain further insights into the dynamics of the relevant hedge fund strategies. Finally, he compares August 2007 to the LTCM crisis.

The 'Lo Hypothesis' is discussed in the next few paragraphs. The key event was probably a trigger of a **large and rapid 'unwinding'** of one or more market neutral funds. Most likely **margin calls** due resulted in liquidations either from a prop desk at an investment bank or a market neutral fund.

Other hedge funds with similar strategies – long/short, 130/30, etc. – cut risk exposure **(de-leveraging)** making situation worse on August 8th and 9th of 2007. The majority of the un-winding and de-leveraging occurred on August 7-9. Price-impact patterns

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suggest it was just a short-term problem. However, the **coordinated losses** were a cause of major concern.

Likely factors include the growth in assets that were largely devoted to L/S equity strategies (130/30 more recently). The **systematic decline of profitability of L/S equity strategies** due to: increased competition, technology advances, decimalization (stocks), decline in retail order flow and the decline in equity market volatility meant that **leverage needed to be increased** in order to maintain an expected level of return.

In addition, liquidity was very low historically at that time and there was a **lack of awareness of how crowded the L/S equity strategies** had become. There was also fear and panic from the escalating Subprime Crisis. The breakdown was not due to specific algorithms but probably to a **sudden liquidation** of one or more quantitative equity neutral portfolios. In the end, the true answer only known to selected industry professionals directly involved in the markets and in these particular strategies in August 2007. This is because the information is the confidential property of hedge funds, prop trading desks at investment banks, prime brokers and major counter-parties.

Several additional insights may be added here. Lots of money was poured into L/S equity strategy funds from 2004 to 2007. Large cap equities had essentially become a 'crowded' trade. Returns were flat or negative prior to August 2007. Value stocks were performing less well than growth stocks since May 2007 and this was after several years of outperformance versus growth stocks. L/S equity strategies invested heavily into value stocks. Many funds were basically chasing the latest winners. In addition, there was cross-collateralization between strategies (multi-strategy hedge funds for example), thus losses elsewhere resulted in a domino effect.

Finally, risk management had targeted a particular volatility level for the hedge fund strategy. Using VAR models, this allowed them to **increase leverage when volatility was low**. When a correction occurred, volatility levels increased. This mean that **leverage had to be reduced** using those same VAR models. Thus, VAR based volatility targeting and leverage adjustments contributed to the losses.

Discussing the August 2007 Quant Crisis and statistical arbitrage hedge funds, Belmont (2011: 186-187) points out that this type of trading relies on financial

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academic research and that fund managers typically come from academia, financial engineering or IT specialists. In addition, he points out the **significant leverage** used which can be **5 to 20 times AUM** (assets under management). In terms of daily trading volume, Belmont says that statistical arbitrage funds come close to representing 50 percent of the U.S. equity markets. These funds (also referring to L/S in general) represent some of the biggest hedge funds. And as more investors piled money into these strategies, the risks of a crowded trade were magnified. The high leverage also scales up the crowding effect.

Furthermore, Belmont (2011: 187) states, *'Because stat arb managers share a common academic lineage and tend to integrate the same academic insights from economics, finance, statistics, math, computer science, and engineering into their trading strategies, opportunities to profit from mis-pricings quickly become crowded trades where profits are fleeting and diminishing. Factor models and statistical arbitrage are no longer black boxes. They are an increasingly crowded and transparent glass box.'*

Even prior to the Quant Crisis, as mentioned by Lo (2008: 255) some hedge funds investing in subprime mortgages and/or credit instruments ran into trouble as mentioned earlier. Belmont (2011: 188) discussing the same events states that these hedge funds **had to de-lever** and needed to sell liquid assets to **meet redemptions (withdrawals)**. Even strategies such as fund of funds, which invest in other hedge funds had redemption calls due to loss triggers.

Finally, what is interesting is that in both the Taylor (2009) and Cecchetti (2008), representing the academic community and the Bank of International Settlements (BIS) respectively, **might not have been aware of the August 2007 Quant Crisis** since this was not mentioned in their respective papers. It could be that the focus in those papers was different. Additionally, the hedge fund community as evidenced in the books by Lo (2008) and Belmont (2011) did not seem to make any connection between the **money market crisis** and the **August 2007 Quant Crisis**. Taylor (2009: 13) makes the point that money market interest rates rose substantially on August 9 and 10, 2007 (discussed in next section). Could the 'Quant' Crisis of August 2007 have been the prelude before this event? Thus, it would be interesting to explore this possible connection in a future study. More details on this in the next section.

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The BDI Model processes as a result of the Super-Portfolio Trigger during the 2007-2008 Credit Crunch are shown in Table 17 below. Please note that the term **'copycats'** refers to several hedge fund strategies that were mimicking the statistical arbitrage strategy. These hedge funds strategies (quantitative equity market neutral, Long/Short Equity and 130/30) were mentioned already in Table 16 on page 153. In addition, multi-strategy funds were involved.

Table 17: The BDI Model Processes under the Super-Portfolio Trigger during the 2007-2008 Credit Crunch

Beliefs	Desires	Institutional
Cognitive Dissonance: Hedge Fund Redemptions – HNWI pulling of HFs *(Herding – psychological)* **'Wolf Pack' Behavior:** Hedge Fund Redemptions – HNWI pulling of HFs *(Herding – sociological)*	**Type I: Action:** Stat Arb & Quant Copycats, Hedge Fund Redemptions – HNWI pulling out of HFs *(Herding – psychological)* **Type II: Conformist:** Stat Arb & Quant Copycats *(Herding – sociological)* **Type III: Opportunities:** **Stat Arb & Quant Copycats *(Clustering)***	**Static and Dynamic** **Type I: Pseudo Arb** **Stat Arb & Quant Copycats *(Cascading)***

Macro – Policy Environment Trigger

It should be noted that there were two Macro-Policy Environment Triggers (MPE Triggers) that directly impacted other triggers and/or were impacted by other triggers.

The **1st MPE Trigger** was a policy mistake – easy money. The easy money policy was a result of the FED lowering rates during the early 2000s. In combination with a long-term US policy over decades that prioritized home ownership, this made for a dangerous situation. Thus, we have the Macro-Policy Environment Trigger directly affecting the Social Trigger.

In August of 2007, the macro-policy environment experienced another shock. Let's call this the **2nd MPE Trigger** – what Taylor (2009: 14) calls 'A Black Swan in the Money Market.' For Taylor (2009: 13) the financial crisis became **much more serious** on the 9th and 10th of Augutst 2007. This was due a huge rise in money market

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interest rates. *'Figure 7 illustrates this using a measure which has since become the focus of many studies. The measure is the spread between the three-month Libor and the three-mounth Overnight Index Swap (OIS).'* This spread is a measure of finacial stress and it is important for monetary policy since it affects the transmission mechanism. This is shown in Figure 2 below:

Figure 2: The Libor-OIS Spread During the First Year of the Crisis

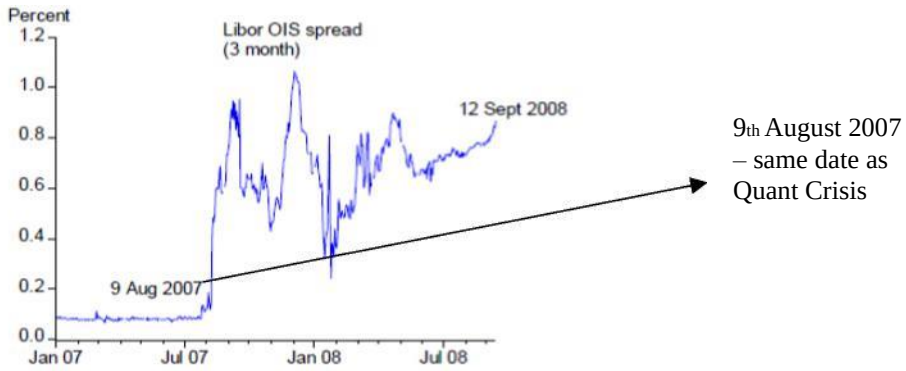

Figure 7. The Libor–OIS Spread During the First Year of the Crisis

Source: Adapted from Taylor (2009: 13) – Figure 7

As a direct result of going through the 4-steps of the STDP Theory, the **'Quant' Crisis of August 2007** and the event in the **money market on the 9th and 10th of August 2007** could be linked. Addressing the question asked on the previous section if the 'Quant' Crisis of August 2007 have been the prelude before this event?', the answer would be highly likely.

Further research needs to done here but thanks to the 4-Step STDP Theory the link between these two events has been proposed here first as far as I know. A likely scenario is that problems in **the subprime mortgages and credit instrument markets** in June/July 2007 somehow were the prelude for the 'Quant' Crisis of August 2007 and the **2nd MPE Trigger (Money Market 'Black Swan')**.

Getting back to the event, **the big question facing policy-makers** was the cause of this problem. Taylor (2009: 14) states that if the problem was **liquidity**, then the right policy would be to inject more liquidity into the system by making borrowing at the discount window easier for example. However **counterparty risk** would require a different approach. The problem would be trust in this case. Thus the bank balance

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sheets would need more transparency. If needed, measures would need to be implemented to deal with falling house prices and the increase in mortgage defualts as well as injecting more capital into banks and financial institutions.

In short, **'uncertainty'** in the market created a false culprit as to where the real problem was. Both traders and monetary policy makers had **mis-diagnosed** the problem. They though the **problem was liquidy, but in actuality it was counter-party risk**. Taylor (2009: 14-16) actually intereviewed traders in the interbank market to gauge measures of counterparty risk and found that counterparty risk or the uncertainty regarding balance sheet of banks as the real reason.

Thus, central bank liquidity tools were ineffective. This was unlike the Great Depression where liquidity could be addressed by printing money according to Taylor. Quite simply policymakers made a mistake.

This **counterparty argument** is futher reinforced by Cecchetti (2008: 6) from the Bank of International Settlements (BIS) in discussing the starting date of the financial crisis states February 2007 as a possibility since losses were reported by many subprime mortgage lenders. '*...But the definitive trigger came on August 9, 2007, when a large French bank BNP Paribas temporarily halted redemptions from three of its funds because it could not reliably value the assets backed by U.S. subprime mortgage debt held in those funds.'* In short, this was the start of the **counterparty risk event**. Trust between banks dissapeared and cash was hoarded resulting in the cessation of inter-bank lending and major liquidity constraint problems for financial institutions.

Taylor (2009: 15-16) tested the **liquidy versus counter-party issue** empirically. He states, *'One good measure of risk is the difference between interest rates on usecured and secured interbank loans of the same maturity. Examples of secured loans are government –backed Repos between banks. By subtracting the interest rate on Repos from Libor, you could get a measure of risk. ...The results are illustrated in Figure 8 which shows the high correlation between the unsecured-secured spread and the Libor-OIS spread.'* This can be seen in Figure 3 on the next page.

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Figure 3: Counterparty Risk Explained Most of the Variation

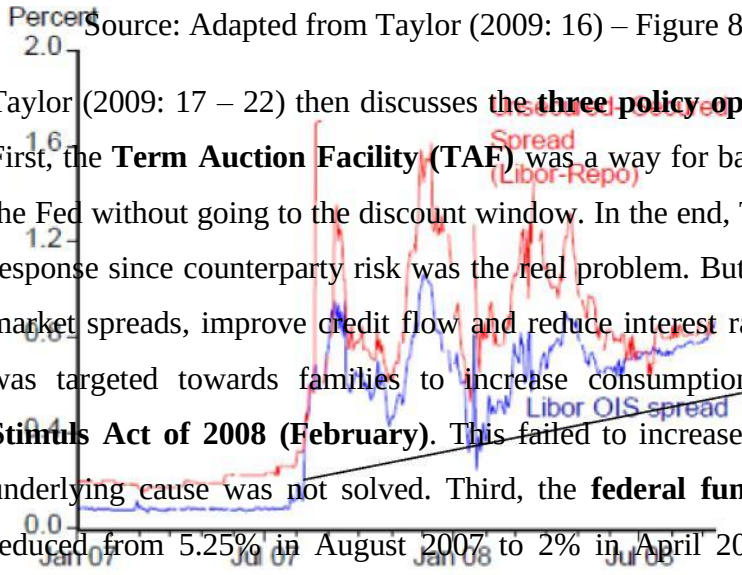

Figure 8 Counterparty Risk Explained Most of the Variation

Source: Adapted from Taylor (2009: 16) – Figure 8

Taylor (2009: 17 – 22) then discusses the **three policy options** that were employed. First, the **Term Auction Facility (TAF)** was a way for banks to borrow easier from the Fed without going to the discount window. In the end, TAF was the wrong policy response since counterparty risk was the real problem. But TAF did decrease money market spreads, improve credit flow and reduce interest rates. Second, $100 Billion was targeted towards families to increase consumption through the **Economic Stimuls Act of 2008 (February)**. This failed to increase consumption because the underlying cause was not solved. Third, the **federal funds rate** was dramatically reduced from 5.25% in August 2007 to 2% in April 2008. The result, oil prices doubled from $70 per barrel (August 2007) to $140 (July 2008) while the dollar plummeted. Oil then dropped significantly as world growth prospects darkened.

Finally, no connection was made by Cecchetti (2008: 17) between the rise in the spread to more than 70 basis points by March 2008 and unconventional monetary policy to provide a direct loan to Bear Sterns on the 14th of March 2008. Cecchetti (2008: 17) states, *'...the Federal Reserve Bank of New York made a loan directly to Bear Sterns. ...By any measure, this action was extraordinary, not since the 1930s had the Fed actually made a loan based on Article 13 (3).'*

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In September and October of 2008, the macro-policy environment experienced another shock. Let's call this the **3rd MPE Trigger** – not to prevent the **collapse of Lehman Brothers** (September 13th and 14th), the announcement of **TARP** (September 19th) and **implementation** of the Trouble Asset Relief Program (TARP) in mid- October. In Figure 4 below, Taylor (2009: 24) shows a dramatic jump in the Libor-OIS spread during September and October 2008.

Taylor (2009: 24 – 25) states that the spread moved on Monday, the 15th of September. This was due to the **decision not to intervene** in Lehman Brothers over the weekend. But it then came down a little on the Tuesday thanks to the AIG intervention. He acknowledges that the spread rose the week after but states that is was *'not far out of line with the events of the previous year.'*

Instead of the Lehman Brothers collapse, Taylor (2009: 25 - 26) blames the political debates and the uncertainty to resolve things during the TARP senate committee meetings. Essentially, there was a *'lack of a predictable framework for intervention.'*

Figure 4: Event Study of the Dramatic Worsening of the Crisis

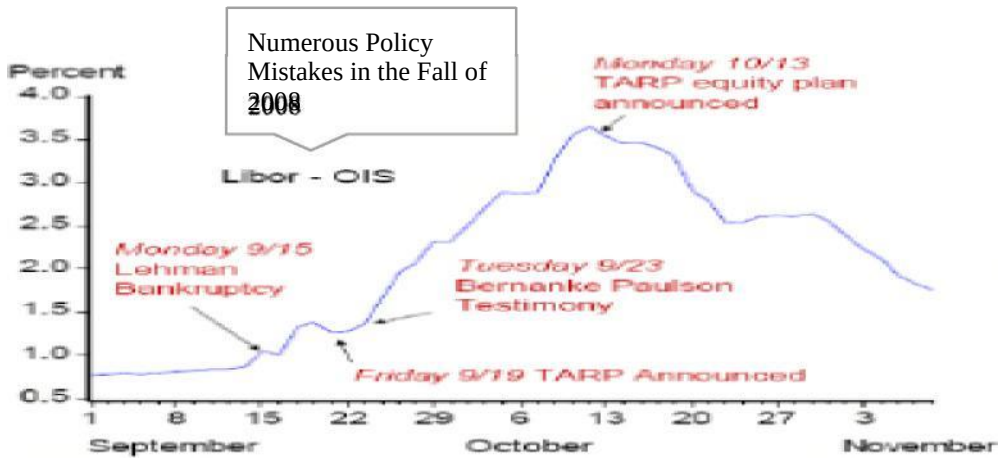

Figure 13. Event Study of the Dramatic Worsening of the Crisis

Source: Adapted from Taylor (2009: 24) – Figure 13

Taylor points to events on September 23 when the spread went up to 3.5%. He speculates policy makers gave the impression that the plan was not thought out very well and things were worse than they had led the public to believe. Thus, **uncertainty**

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about government policy created panic in the market. This is the same uncertainty still lingering from the time of the Bear Sterns intervention in March.

The markets were unclear regarding the procedures on government intervention to prevent failed financial institutions, more clarity was needed. According to Taylor, the **uncertainty** was a result **three main areas**. First, the intervention policy of the Treasury-Fed was unpredictable, and the market saw it as increasingly negative after the Fall of 2008 as uncertainty peaked. Second, confusion was seen in the rational for intervening – yes for Bear Stearns and AIG, but no for Lehman. Third, the guideline regarding TARP was unclear.

The level of panic and uncertainty can be seen in the following remarks by David Belmont (2011: 1 – 5) who describes the trading environment during the 2nd half of 2008 as follows: *'A record 1,471 individual HFs failed or closed down during the credit crisis of 2008. A further 668 failed or closed during the first half of 2009.' In 2008 alone, the HF failure rate more than doubled from 7 to 16%. Indeed, while all of 2008 was a lethal year for hedge funds, September and October were particularly deadly. The gauntlet that hedge funds had to run during these two weeks in 2008 was deadly.'*

Belmont (2011: 1-5), also states that a *'tsunami swept through the financial markets,'* lasting about **eight weeks from September 2008**. First, Fannie Mae and Freddie Mac were brought under control, then the bankruptcy of Lehman Brothers. On top of this, Bank of America merges with Merrill Lynch and AIG received an $85 bailout package. If that is not enough, then the largest bank failure in history – Washington Mutual. In addition, the US congress passes a $700B bank rescue plan.

In short, the 2007-2008 Credit Crunch case study shows that politics, specifically the **macro-policy environment**, was critical since the **'uncertainty'** overhang greatly impacted numerous trading strategies and was the underlying cause for three triggers – social, model, and super-portfolio. Thus, the macro-policy environment trigger in the case of the 2007-2008 Credit Crunch acted as a facilitator for several other crisis triggers.

It did not end here as the crisis then spread to Europe. And the **4th MPE Trigger** was the lack of leadership regarding the Euro Crisis. Germany along with France

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could have brought more firepower early in the crisis to prevent it from escalating into an even bigger problem.

The crisis was initially about the risk of devaluation and the break-up of the Euro. Although possible, the risk was overblown since the market probably discounted the political will of the Europeans and support from the USA to maintain the Euro. This can also be considered a **Politics-Specific Trigger** – albeit the largest one in history if it ever occurred. In other words, a very large currency crisis was ultimately avoided.

However, I think it more appropriate that we consider it a **Macro-Policy Environment Trigger** since it had an impact on **uncertainty** and it is much more **complex** due to European politics and geopolitical interests than one would find in an ordinary currency crisis. Essentially, it escalated as a result of internal divisions on policy in Europe and domestic political concerns.

It eventually turned into a **sovereign debt crisis**. European countries most exposed were Ireland, Greece, Portugal, Iceland, Spain and Italy. Europe could probably contain the first four countries, but Spain and especially Italy would spell big trouble of the Eurozone and potentially Europe.

However, the historical context of the Euro Crisis goes back much further in time than 2010. Giavazzi and Spaventa in Beblavy et al (2011: 216) give the standard view that the 2009 – 2010 Euro Crisis began with exposure of the Greek budget deficit reporting fiasco, but they also acknowledge that there were deeper causes.

Clerc and Mojon in Beblavy et al (2011: 280 and 283-284) point out **that monetary policy of the Eurozone** did no change at all until September 2008 with the failure of Lehman Brothers. *'...the unprecedented situation that arose after Lehman filed for bankruptcy led to the Eurosystem to adopt non-standard measures and implement them on a grand scale.'* A huge injection of liquidity was then follow-up with currency swaps with the US Fed. Then in a coordinated action, the Eurosystem joined several key central banks – Fed, Bank of England, Bank of Canada, Riksbank and the Swiss National Bank, in lowering key interest rates by 0.50%.

Regarding the **connection to the 07-08 Credit Crunch** it was earlier than August 2007. Clerc and Mojon in Beblavy et al (2011: 280) note that the Eurozone was tightening policy rates that had started in 2005. However, on the 9th of August 2017,

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BNP Paribas froze activities on three Asset Backed Securities (ABS) mutual funds. About €95 Billion was needed to avert a liquidity problem. Combined with prior pressure from inflation (oil prices) and stagnant growth, the policy rates had in fact stopped rising in June 1997.

In short, the deepest problems in the Eurozone were four countries – Spain, Ireland, Greece and Portugal according to Giavazzi and Spaventa in Beblavy et al (2011: 213219). **Spain and Ireland suffered from huge housing bubbles** that were larger than the US housing bubble. For Greece and Portugal, it was a case of **not saving enough**. Greece had better growth numbers but also had a bigger fiscal imbalance.

Table 18 below shows the effects from the Macro-Policy Environment Trigger on the BDI Model processes during the Credit Crunch/Euro Crises Period:

Table 18: The BDI Model Processes under the Macro-Policy Environment Trigger during the 2007-2008 Credit Crunch/Euro Crunch

Beliefs	Desires	Institutional
Cognitive Dissonance: Hedge Fund Redemptions – HNWI pulling of HFs *(Herding – psychological)* **'Wolf Pack' Behavior:** Hedge Fund Redemptions – HNWI pulling of HFs *(Herding – sociological)*	**Type I: Action:** Most Investors *(Herding – psychological)* **Note:** Macro-Policy Environment trigger induced **uncertainty** then panic set in and traders stopped and pulled out of market - herding. **Type II: Conformist:** Most Investors *(Herding – sociological)* **Note**: Macro-Policy Environment created **large uncertainty** and all investor types concluded that trading method useless. Watched what gurus were doing since direction needed. **Type III: Opportunities:** ***Most Investors – Risk Types I, II, III, and IV (Clustering then Cascading)***	**Static and Dynamic** ***Most Institutional and Individual Actors in all Risk Frameworks*** ***Type I*** ***Type II*** ***Type III*** ***Type IV*** ***(Cascading)*** **Cascading** – a big event needed to dislodge actors from model. Initial reaction based on herding and clustering effects then **CASCADING** took over where they just gave up on their system due to extremely high uncertainty.

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Thus, we should see the Euro Crisis as a result of the Macro-Policy Trigger as stated earlier. The reasons are simply that Europe failed politically to stomp out the crisis. This had to do with political decision making in a complex environment.

Razin (2014: 41) states that **unlike the quick action of the US** during the savings and loan crisis of the 1980s, the Europeans did not act. The US federal government transferred the equivalent of 20% of the GDP of the southwestern states engulfed in this crisis. The action was quick and immediately stopped the spread of this crisis. The question is **why didn't Europe immediately stop** the crisis from escalating by spending a few hundred billion at the most when the crisis started?

Instead, the Europeans in managing the crisis **acted similarly to the Japanese** as noted by Schanble (2015: 147-148). He states, *'It seems that Europe has taken a similar path to Japan in economic policy patterns in response to the crisis ...The outcome seems to be a persistent recession.'* Of course, it is much harder to take action in Europe due to **difficulty of forming a consensus** as a result of different national interests. The origins of the crisis began right from the start in the failure of European countries to even keep to the Maastricht conditions of inflation below 1.5%, public deficits less than 3% and a public debt less than 60% of GDP. Over time most of the countries in the Eurozone exceeded one or more of these numbers.

In addition, the **Euro was a flawed currency** to begin with. Labor mobility was far below ideal. Additionally, different languages and standards added to the problem. And most importantly, fiscal policies varied across the Eurozone. Unfortunately, the US ideal of one fiscal policy and labor mobility was never met under the Eurozone.

In the end, **policy-making ground to a halt** at the critical moment. This could be due to the trepidation of having citizens of one Euro country be responsible for the debts of citizens of another Euro country. For example, the German and Dutch paying for the Greeks and Spanish, or even worst the Italians.

Razin (2015: 60-61) argues that the Eurozone is the modern version of the **classical gold standard** era. If the Eurozone would accept higher inflation that would ease the adjustment of the southern European countries. However, the better choice would have been to introduce fiscal union before the monetary union. Europe may have eliminated the moral hazard risk by not supporting the adjustment countries, but the

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risk is that the Eurozone ends up like Japan in terms of growth with potentially higher costs in the future.

Step 4: Psychology

Step 4: Psychology would occur as discussed in Chapter 5 (pages 128-132), thus it will not be repeated here. In terms of the market actors and the institutional make up of investment strategies and players, major trends have emerged. An important result of the crisis was **to lower return expectations** for all investors. Thus, hedge funds which typically had high fees – a 2% management fee and 20% performance fee, were especially hard hit. The **management fee has dropped** with some hedge funds now accepting a 1.5% management fee along with a 10 or 15% **reduced performance fee**.

According to the AIMA's Roadmap to Hedge Funds 2012 report (2012: 65), there is a **movement to replicate some hedge fund strategie**s in order to reduce fees and overall costs. These are called **alternative beta strategies** and are designed to create hedge fund exposure synthetically. In addition, the Fund of Funds category has seen less interest since it has an additional layer of fees.

However, the Credit Crunch called the **policy idea of market-led liberalization** into question. Subsequently, the idea that the IMF was irrelevant was also questioned. As a result, the pendulum had swung towards **giving the IMF more power** in the management of crises according to Moschella (2012).

In fact, the G20 had decided to provide the IMF an additional $500 to $750 billion of additional support and funding. Moschella (2012: 150) states that, *'...what the G20 proposals nonetheless show is the emergence of a rethink about the role of the IMF in the international financial system. In other words, world leaders did not simply decide to increase IMF resources. They also decided that the Fund has to play a more prominent role in the management of the global financial system.'*

In short, policy-makers are now of the **view that markets cannot regulate themselves** and that more oversight is needed. Thus, a regulatory and institution change to more coordination, transparency and a stronger IMF. This is an example of how policy-makers learn from the crisis and adapt to a new regulatory environment. Thus, both policy-makers and market actors learned from the crisis and a new state emerged – a stronger IMF with lowered investor expectations.

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Case Study 2

STDP Theory and the Japanese/Asian Crisis Contagion Period

Abstract

The STDP Theory of Financial Crises provides a unique perspective on our understanding and explanation of the Japanese/Asian Financial Crisis Contagion period. A case study approach utilizing process tracing methods highlights how all two of the three mechanisms (macro and disruption) of The STDP Theory can be applied towards uncovering the process of how a major crisis unfolds.

Key Words: Financial Crisis, Crisis Theory, Process Tracing, Case Study

Brief Overview the Case Study

The focus of the case study is The Asian Financial Crisis of 1997 a major crisis plus two related crises – The Russian Debt Default of 1998 and Long-Term Capital Management (LTCM). Incorporating the **historical context** leading up to the Asian crisis, we included an additional major crisis, the Japanese Crisis of 1990. Instead of looking at these crises as separate events, the approach taken here is to look at the four crises as part of one crisis contagion period.

The Japanese Crisis of 1990 is an interesting case of how bad policy failed to resolve an asset price bubble of what was once the fastest growing economy in the world. Japan has yet to recover from this crisis and has lost almost three decades to slow growth and deflation. In fact, this crisis was often cited as an example during the 2007-08 Credit Crunch of what the future state of world economies would resemble if policy failed.

Although the Japanese Crisis was a major crisis it mainly affected Japan thus could not be compared to The Asian Financial Crisis of 1997 in terms of severity. Prior to the Credit Crunch this was the only major crisis that could even be said to even come close to The Great Depression. **The triggers were broad and complex**. In addition, **contagion was very high** and political resolution varied in the affected countries. This crisis eventually led to other crises in developing countries outside of Asia - Russia, Brazil, Argentina and Turkey. However, it had a limited impact on developed

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markets. The Brazilian Crisis of 1998 and the subsequent crises in Turkey and Argentina were not covered since the **Russian** (Geo-Political Resolution Type Crisis) and **LTCM** (Super-Portfolio Trigger) were considered more important for highlighting the STDP Theory. In both crises, strong policy action was instrumental.

The Russian Debt Default of 1998 is the first sovereign default in the modern era. Contagion from Asian Financial Crisis of 1997 played a role in this crisis. In addition, the crisis of Long-Term Capital Management in 1998 was a direct consequence of the Russian Crisis. The LTCM crisis is a good example of a 'super-portfolio' trigger since the underlying reasons closely resembled the 'Quant' Crisis of 2007.

Next, we provide brief look at explanations of The Asian Financial Crisis of 1997. This is the key case during this crisis period thus a more in-depth look is warranted.

Explanations of The Asian Financial Crisis of 1997

Willett et. al (2004) look at four hypotheses about the Asian Crisis. The four hypotheses are: Mahathir, Portfolio Herding, International Moral Hazard and Lead Lender.

The Mahathir hypothesis places the blame on hedge funds and other portfolio investors. Calvo and Mendoza (2000) are the proponents of the Portfolio Herding hypothesis that argues that once the crisis began in Thailand contagion spread to the rest of Asia due to rational herding by portfolio investors. Rational herding was a result of information that is too costly to obtain combined with indifference due to the investment mandate/strategy of diversified portfolios that is common with mutual funds. This provides little rational incentive for portfolio managers to look at justifying fundamentals when the easier alternative is just to pull out of the crisis area. The Moral Hazard hypothesis places the blame on government guarantees and/or international bailouts that resulted in large capital inflows and then outflows from Asia. Finally, the Lead Lender hypothesis is based on Kaminsky and Reinhart (2000) who place the blame on the lead lender banking country. They looked at the relationship of lending by Japanese banks and the severity of the crisis in various countries. Japanese banks were the dominant lender in all the Asian countries hit by contagion except for the Philippines where American banks held the dominant

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position. The Philippines was the least affected by the Asian crisis. Evidence supported this view but was very weak.

Willett et. al (2004: 30-40) found evidence that falsifies all four hypotheses based on international financial flows. That does not mean that the hypotheses were not applicable with some refinement. They initially only completely rejected the Mahathir hypothesis. The authors found all the hypotheses **too narrow and viewed the explanations as partial and not complete** explanations. They noted that a key finding was the **role of international banks** were under-emphasized compared to **portfolio investments** which they thought were overemphasized. This offered some support for the **Lead Lender hypothesis** since Japanese banks were at the heart of the regional liquidity issues. In addition, they found mutual fund managers withdrawing from Asia, thus they believed that the **Calvo-Mendoza Rational Herding hypothesis** was probably correct but drowned out by the much larger outflows from commercial banks.

Regarding the Mahathir hypothesis, Willett et. al (2004: 27) argue that the data should show that hedge funds took the lead and other portfolio investors were the laggards in pulling out of Asia. Citing the Calvo-Mendoza analysis that emphasizes information and monitoring costs, then bank loan officers would have the least information costs and more monitoring incentives than hedge funds or portfolio investors. In addition, emerging market managers would be better informed than most portfolio investors.

To falsify the Mahathir hypothesis, the study by the IMF (1998) is cited by Willet et. al (2004: 30-31). The IMF study concluded that **unlike the ERM crisis in 1992 where hedge funds were the clear leaders** in taking positions (Soros against the UK), **the evidence is not so obvious in the Asian case**. They state, *'Even though some hedge funds had large short positions in Thailand, it is not clear that they were earlier than other investors in building up those positions.'* In addition, it was reported by Soros (1998) that he was short the Thai baht and Malaysian ringgit. These positions ranged from six months to one year and were entered in early 1997.

On further inspection, we need to question how Thailand was not targeted by speculators when the Hong Kong dollar (HK$) was attacked several times in 1997 and 1998 according to Liew and Wu (2002: 441). Hong Kong successfully defended the peg to the US dollar. Delhaise (1988: 88-90) notes that by early 1997 it was

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noticeable to the market that defending the Thai Bhat would be difficult. The Bank of Thailand (BOT) wasted $33 Billion USD over the year attempting to defend the currency. In fact, speculators did have big bets against the Bhat but the real reason according to Delhaise was not the speculators but the bad policies of the BOT. Thus, the evidence presented by Willett et. al (2004) is not conclusive and we cannot rule out completely the Mahathir hypothesis in the case of Thailand.

More importantly the point of whether hedge funds sparked the Thai currency collapse might be moot. What we are really after here is whether the Asian crisis started in 1997 without any warning signs or was is a result of much longer-term factors that eventually triggered the crisis in 1997.

Zhuang and Dowling (2002) use an Early Warning System Model (EWS) to test two competing views on the causes of the Asian crisis. Radelet and Sachs (1998) state that the initial turmoil started in some Asian countries which resulted in panic and then contagion spread the crisis to rest of Asia. On the other hand, Corsetti, Pesenti and Roubini (1998) place the **blame on structural, policy distortions and fundamental weaknesses**. Their EWS model shows strong warning signals of heightened financial vulnerability in five counties prior to the Asian crisis. Thus, the Corsetti, Pesenti and Roubini (1998) view argues for pre-existing causes such as: fundamental weaknesses such as overvalued currencies; deteriorating current accounts; excessive borrowing and mismatched balance sheets by banks; economic slowdown and excessive domestic credit growth.

Furman and Stiglitz (1998:1-9) agree that fundamental factors such as those mentioned above are part of the standard symptoms and contributing factors of most crises. However, they **disagree** that the most important factors for the Asian crisis are macroeconomic aggregate numbers and that the crisis was inevitable since it is especially difficult to see this when there is a wide range of countries and the subsequent severity varied greatly among the countries. In short, they state that crisis prediction models saw the fundamentals as mostly fine and thus **no one saw it coming** and policy makers did not take precautions. Deeper and earlier factors were the causes such as current account deficits and FX rate misalignments.

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According to Furman and Stiglitz (1998: 12-13), the 'East-Asian Miracle' was viewed as a success with praises such as 'business-government coordination,' outward orientation, high saving rates and effective governments. This view changed after the crisis and East Asian economies were known for mismanaging FX rates, badly regulated financial markets, poor investment decisions, deficits in the current account, lack of transparency and poor corporate governance. These labels plus the term 'cronyism' were now closely identified with the failures of these economies.

Finally, a commonly held view of the Asian crisis is provided by D'Aspice and Ferri (2010: 75). They see the crisis as a **twin crisis**. This view originated with Kaminsky and Reinhart (1999). In short, currency depreciation along with interest rate liabilities of the credit system due to foreign currency exposure leads to distress and bank balance sheets deteriorate as non-performing loans increase. The result is both a **currency and bank crisis**.

In short, the **1997 Asian Crisis is difficult to interpret and is based on your reference point**, that is either before or very long before the Thai Bhat collapse in 1997, or immediately afterwards.

Supporting Case Study and Process Tracing Tests

A brief overview of the process tracing tests is provided here for the convenience of the reader. For a more detailed discussion please refer to Chapter 3. Three of the four process tracings tests are in order of strength from Hoop (certain, but not unique), Smoking-Gun (unique but not certain) to Doubly Decisive (both unique and certain). The Straw in the Wind Test is just circumstantial evidence and thus neither unique or certain. Types of evidence, these are categorized as: Pattern (statistical), Sequence (temporal processes), Trace (exists or not) and Account (context of the evidence).

A rough visualization on how the **Japanese/Asian Crisis Contagion Period** unfolds under the STDP Theory of Financial Crises is shown in Diagram 11 (page 173). This is meant as an aid to help the reader better understand the crisis using the 4-step process of the STDP Theory. The size of the factors is a very rough estimate by the author.

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Mechanism Tests – Macro, Macro to Micro Disruption and Micro (no covered)

The temporal processes the Japanese/Asian Crisis Contagion Period can be explained by the STDP Theory of Financial Crises. The evidence here passes the **Smoking-Gun Test** since this is a unique explanation but not certain.

Type of evidence provided is **Sequence** regarding the Macro Mechanism (Social, Trigger, Disruption and Psychological), Macro to Micro Disruption Mechanism and the Micro Mechanism (partially). The STDP Theory provides a logically consistent explanation of how the Asian crisis unfolds through **two out of the three mechanisms**.

Trace evidence is present especially in the Trigger stage. As can be seen in Diagram 11 (page 173), Step 2: Trigger for this crisis period is broad covering **three trigger mechanisms** in the STDP Theory. The most important trigger mechanism during the Asian Crisis is the **Politics-Specific trigger** that results in **confidence** (or rather a loss of confidence). The Politics-Specific Trigger resulting in a huge loss of confidence during the crisis and played a prominent role. There were **4 trigger events under the Macro-Policy Environment (MPE)** and this resulted in uncertainty. However, there was one MPE **counter-trigger event** due to **geo-political** reasons in the case of the Russian Debt Crisis of 1998. This had the effect of reducing uncertainty. The Social Trigger was present and related to the confidence and herding issues. Finally, the US Government **prevented a Super-Portfolio Trigger** by taking swift action in the LTCM Crisis. LTCM was a hedge fund that had assets of 1 Trillion USD that if left to fail would have resulted in a severe strain on the world financial system.

All three processes affecting the market actors as shown in Diagram 11 (page 173) in Step 3: Disruption Mechanism. However, the biggest circle is c**lustering**. This shows a convergence or **'rational'** herding of trader beliefs in their models/trading strategy due to the huge loss of confidence during the crisis. The definition of **Hirshleifer and Teoh (2003: 27) regarding clustering** both emphasize systems which represent the external factor - **social – institutional**. The Calvo-Mendoza Rational Herding hypothesis discussed earlier also offers a good explanation.

The **threshold for 'uncertainty'** was not high enough and the result was that the cascading effect was not as big and probably minimal during the Japanese & Asian

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Contagion Period. As discussed earlier, strategic considerations resulted in a **Geo-Political trigger** that quickly resolving The Russian Debt Crisis of 1998 and the US stopped the **Super-Portfolio trigger** in the case of LTCM. This contained the crisis**.** In short, quick action on the part of the US probably prevented the Asian Crisis from morphing into something much bigger and more dangerous.

In addition, **account evidence** is present since the **context of the evidence** provides a reasonably good explanation that is broader than other explanations. For example, there is a greater emphasis on the **historical context** since the Japanese Crisis of 1990 is seen as part of the same crisis contagion period. The STDP Theory captures **macro factors** – processes at the macro or sequence (step-level) and the macro to micro **disruption process** at a good level of depth. The micro level processes were not covered in this case study.

In addition, the information contained visually in Diagram 11 (page 173) helps us to roughly compare the severity and complexity of the Japanese/Asian Crisis Contagion Period with the Credit Crunch/Euro Crisis Period. The **comparison of the process** through the steps within the 4-step process theory – STDP Theory of Financial Crises shows that it was not as severe. In Step 2, the **Macro-Policy Environment (MPE) triggers** during the Credit Crunch/Euro Contagion Period were **bigger** than during the Japanese & Asian Contagion Period. In short, the market saw the Asian Crisis as an emerging market FX and banking crisis, thus the large circle for the Politics-Specific Trigger**.** 'Confidence' was greater than 'uncertainty.'

Individual steps of the 4-step process theory measure up differently on the process tracing tests. Step 1: Social is very close to passing the **Doubly Decisive Test** since the actor breakdown during this crisis period is much closer to reality than most competing explanations. This is certainly unique and very close to being certain, thus this part of the model is certainly at the Smoking Gun Test level but closer to the Doubly Decisive Test level. On the other hand, Step 4: Psychology just passes the **Hoop Test** since this part is not unique. In between sit Step 2: Trigger and Step 3: Disruption, both these steps provide a unique explanation, but not certain as other explanations are available, thus they can be considered at the **Smoking-Gun Test** level. Finally, the Micro-Level Mechanism was not tested in detail thus we cannot make the claim that it passes the Smoking-Gun Test level.

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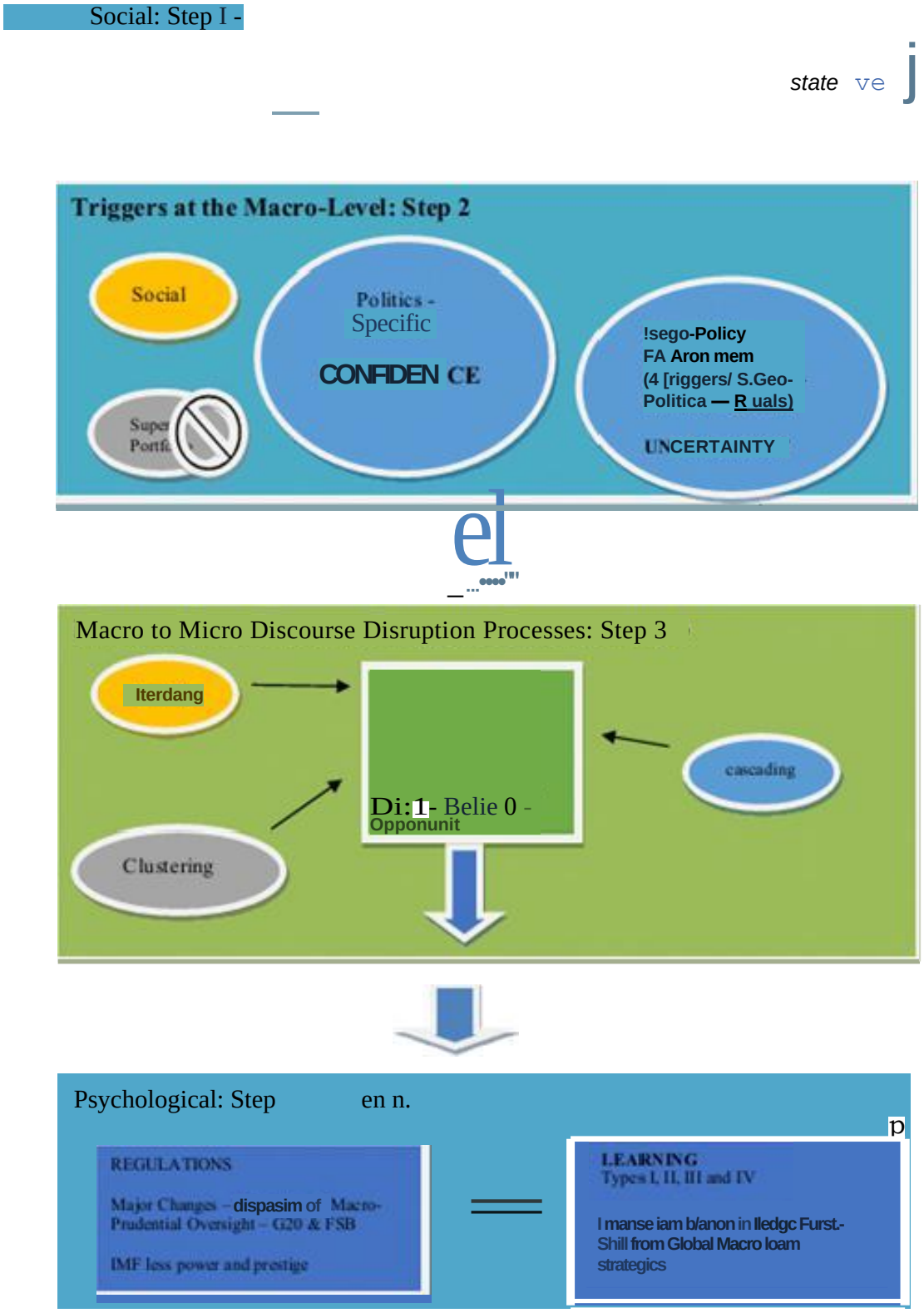
Diagram 11: STDP Theory and the Japanese/Asian Crisis Contagion Period



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Step 1: Social

The market actors prior to the start of the crisis would resemble the ones shown in Table 19 below that would constitute the market structure during the modern period of finance. The key actors fall under **Type II: Market Makers** – Banks (Japanese and non-Japanese) and Proprietary Trading Desks at Banks/Investment Banks (FX trading) plus **Type III: Small Alpha** – Emerging Market Mutual Funds. Note that emerging market hedge funds were not as popular then and the dominant hedge fund strategy at the time was Global Macro accounting for 39.3% of hedge fund AUM in 1990 (AIMA's Roadmap to Hedge Funds 2008). Finally, high-frequency quantitative funds were just being developed and did not play a role in this crisis.

Table 19: Market Actors adapted to the Asian Crisis Period 1997 - 1998

	Main Actors	**Sub-Actors**
Type I **Pseudo - Arbitrage**	**Mutual Funds and Insurance Mutual Funds** - Passive Strategies *Asian Crisis (contagion and herding)* **Fixed Income Arbitrage** *LTCM Crisis*	**Quantitative Strategies** Convertible Bond Arbitrage Equity Market Neutral – Fundamental Arbitrage Capital Structure Arbitrage
Type II **Market-Makers**	**Banks – Japanese and non-Japanese** **Proprietary Trading Desks at Banks/Investment Banks (FX trading)** *Speculative Attacks on Currencies*	
Type III **Small Alpha**	**Emerging Market Mutual Funds** Active Strategies *Asian Crisis and Contagion*	
Type IV **Large Alpha**	**Opportunistic** **Global Macro Hedge Funds** *Speculative Attacks on Currencies*	**Event-Driven** Distressed Investing **Opportunistic** Emerging Market Hedge Funds

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Brief Overview of the Regulatory Environment and IMF

For the IMF, the 1990s were the era of increased capital flows and ideas such as the 'Washington consensus' and 'orderly liberalization.'

According to Moscella (2012: 91-92), the Mexican crisis was a critical test for these ideas. The views of the IMF plus developed and developing nations seemed to reinforce 'orderly liberalization' and to strengthen the idea of the benefits of international capital flows if managed properly.

Thus, the IMF gained a stronger role in the area of capital account liberalization and a bigger role in surveillance and financial assistance. The IMF articles were amended to give the IMF the *'mandate and jurisdiction over capital transactions.'*

Step 2: Trigger

The trigger for the Asian Crisis is more socio-political and historical in nature than the simple Thai FX trigger commonly cited in the literature. It was a creation of Japanese geo-political consideration and the failure or inability of Japan/E. Asian to adapt to the new Chinese threat starting with devaluation of the Yuan. It should be remembered that at this time the Yuan was pegged to the USD as were many E. Asian currencies and this was a trigger source.

Thus, the main trigger under the 4-Step Process Model of Financial Crises is **Macro-Policy Environment** along with geo-political considerations. This allows us to take the correct historical perspective into account. In this particular case, we would view this as an **over-arching trigger** spanning the Japanese and Asian Crisis Contagion Period.

In contrast, the standard view of the Asian Crisis is provided by Razin (2014: 23): *'The Asian financial crisis that erupted in 1997 was a money and credit impolosion induced by foreign capital flight). It began as a run on Asian banks by foreign short-term depositors and expanded into an assualt on government foreign currency reserves...'* While all this is true, the real cause was something more complicated.

In order to understand the historical context, we need to discuss Japanese policy, specifically the development state concept. Yoshimatsu (2003: 102-103) states that, *'The major aspects of the developmental state , which was pioneered by Japan and*

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was emulated by other East Asian countries, were regarded as the causes of the crises.' The negative view of the developmental state highlights crony capitalism, corruption and instability of export-oriented industrialization (relying on US for a majority of the exports).

The development state view according to Yoshimatsu (2003: 104) puts the state first and the market second. First states have autonomous power and can decide on the right industrial policy objective. Second the state can select strategic sectors and industries, and third because this idea is deeply embedded in society the state can pursue rapid industrialization.

Now that the brief discussion on the developental state is completed, let's turn to the Japanese Crisis. The origins of this crisis are seen as finanical in nature. Razin (2014: 20) takes this path. Speculation was fueled by bank willingness to lend at very low rates. However, the historical context is left out in most accounts of the standard view.

Obsted in Hamada et al. (2011: 53) includes the historical context since he places the origins of the Japanes Crisis much further back than Schnable (2015) for example. He says it began when the US was undergoing a policy of disinflation and fiscal expansion in the 1980s. This caused other currencies to loose value versus the US Dollar. Trade tensions arose which led to The Plaza Agreement of 1985.

Schnable (2015: 126-127) describes the origin of this crisis as taking place later. He says that it started over a political conflict between the US and Japan regarding the trade imbalance. The Plaza Agreement of 1985 was a result of the US forcing Japan to correct this situation through Japanese Yen appreciation which was supported by monetary tightening by the Bank of Japan. We can view this as the **1st MPE Trigger.** The result was a slowdown of exports that led to a recession. The Bank of Japan then reduced the rate from 8% to 3.5% in 1987.

Bevacqua (1998: 412) makes the point that it was the Ministry of Finance that influenced the Bank of Japan to reduce rates. The Bank of Japan pumped lots of liquity into the system by printing money as well. This was the start of the credit boom in Japan. The Japanese exporters gained as the Japanes Yen weakened. The low rates fueled asset bubbles in the real estate and stock markets.

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Howerver, the trade inbalance between the US and Japan was still present. Bevacqua (1998: 411) blames the structure of the Japanese economy for the failed attempt by the Reagan administration to reduce the trade imbalance between the US and Japan as agreed in The Plaza Agreement of 1995.

To further compound the matter, the Japanese then agreed to stimulate the domestic economy in the Louvre Accord of 1987 since the Japanese Yen appreciation had failed to reduce exports to an acceptable degree. The **2nd MPE Trigger** was the Louvre Accord of 1987 that led to fiscal expansion in Japan. This further inflated the asset bubble.

The result was rising inflation and concerns regarding the asset bubbles which resulted in the Bank of Japan raising rates in 1988. The stock bubble burst in December of 1989. However, the Bank of Japan kept rates high for two more years till 1991. This was also the time when the real estate bubble burst. Then the Japanese failed to deal with non-performing loans at the banks and this further complicated the problem. Thus bad post-crisis policy choices are the **3rd MPE Trigger.**

Then six years later in 1997, the Asian Crisis occurred. On the surface, this crisis was due to a **Politics-Specific Trigger –** the collapse of the currency in Thailand.

The Malaysian Prime Minister blamed international speculators (hedge funds) and specifically blaming George Soros, a famous glogal macro hedge fund manager, at a seminar organized by the IMF. He also was especially critical of liberalizing capital controls according to Wijnholds (2011: 27).

Mosschella (2012: 97-105) points out that the IMF Director Camdessus had concluded that blaming hedge funds for the cause of the Asian Crisis was mistaken. Although hedge funds did not cause the crisis, Camdessus acknowledges that perhaps they played a role in the timing of the crisis by putting serious pressure on the currencies, specifically the Thai Baht from July 1996 to early 1997. Many East Asian currencies reached their lowest point around January 1998 – Indonesian Rupiah down by 81%, Malaysian Ringgit had lost 46% while the Thai Baht lost 55% of its value.

Ueda (1998: 328) states that the standard view on the Asian Crisis of 1997 looks at it as a typical banking crisis. Borrowing took place in the short-term and in this case

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from foreigners and lending took place in the long-term creating a risky condition. Speculation resulted in asset bubbles in real estate and the stock market.

However, Ueda (1998: 328 - 330) states that some of the causes were special to East Asia. He states, *'I argue that the region's deep relationship with the Japanese economy and movements in the yen had a strong influence on the boom-and-bust cycle.'* For example, Japanese FDI was between 24-30% of all FDI in East Asian from 1985 to 1995.

The notion that the Asian Crisis of 1997 had its roots in the Japanese Crisis is also brought up by Bevacqua (1998: 411) in which he states, *'To understand the crisis in Asia, it is perhaps best to start with the bubble in Japan, not only because a similar fate befell the economies in East Asia, but for what it says about the Japanese Model.'* It should be noted here that the Japanese Model refers to the developmental state as discussed earlier.

In short, as a result of the Japanese Crisis, unfavorable FX rates and a general loss of competitiveness in Japan; the growth-model was exported to E. Asia. In effect, making E. Asia a sub-assembly line for Japanese Multinationals.

This was fine since the region had a favorable environment up until 1995 since their currencies were pegged to the US Dollar. And during this time period the Japanese Yen appreciated providing East Asian countries with an advantage. The East Asian Miracle was strongly supported by a strong Japanese Yen.

However Ueda (1998: 328) makes the point that in the pre-crisis period of 1995 till 1997, the East Asian currencies appreciated as the Japanese Yen depreciated versus the US Dollar. This resulted in lots of excess capacity and a less competitive situation.

Ueda (1998: 333) states that in early 1997, the Japanese Yen had reversed and started to depreciate, this made these economies less competitive. He states, *'The rise of the real exchange rate must have turned a significant portion of the East Asian productive capacity non-competitive, generating huge excess capacities and thus the seeds of the crisis.'*

What is not mentioned here is the additional effect of China. **China devalued** in the mid-90s and this made East Asia less competitive and subsequently Japan less

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competitive. More FDI then shifted towards China and away from East Asia and Japan. Bevacqua (1998: 418) states that the devaluation of the Chinese Yuan in 1994 by 35% had a major impact on Asia. For example, Chinese exports to the US grew from 6% to 26% in about 10 years.

The **4th MPE Trigger** occurred in what was the aftermath of the Asian Crisis. This crisis could be viewed as the devlopment state model (Japanese Model) versus the neo-classical liberal model. This trigger concerns who was capable of and who was willing to stop the crisis in Asia.

This could have been done by defending the Japanese Model by the lead country in the region – Japan. The Japanese Model failed to win due to **failure of Japan to defend** its model in East Asia. Thus the IMF dictated policy and neo-liberal reforms were instituted. This resulted in a backlash with the IMF eventually being weakened as was discussed at the start of the first case study.

The Japanese Model relied heavily on exports to the US. Bevacqua (1998: 421) states there were different versions of the Japanese Model in East Asia but main element that all these versions had was to keep exporting.

Hughes (2000: 229) likened the Japanese Model in East Asian as one giant Japanese factory model that essentially shifted its own crisis to East Asia. He states, *'...it does not deliver complete economic developments to those East Asian states to which Japanese DFI is directed, and brings with it an in-built vulnerability and lack of sustainability ...'*

The geopolitics of the Cold War resulted in an agreement between Asia and the US. The agreement was to keep US markets open to accommodate exports from the East Asian-Pacific Region according to Bevacqua (1998: 421). Essentially, to keep markets open for Japan. It also stipulated to help keep the Yen weak by intervening in FX markets plus to provide security for Japan under the 'Nye Initiative.'

In short, this meant that the key was access and the capacity of US markets to take in exports from Asia. In short, the Japanese had overinvested in their growth model in East Asia helping to create a bubble.

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However, if there was overcapacity or something went wrong the Japanese were too small to even contemplate being the engine of growth according to Bevacqua (1998: 420). Thus, the Japanese could not defend their own growth model since they did not have the capacity to absorb excess exports.

In short, **crisis management** on the part of the lead country in Asia at the time was poor. First the Japanese failed to defend their model in the face of IMF policies to dismantle it. Second, US geopolitical concerns eventually led to the US taking the lead in the face of Japanese weakness and European disinterest.

Bevacqua (1998: 417) makes the point that Japan made an **additional policy mistake**. The Finance Ministry implemented a sharp rise in taxes in April 1997 that reduced demand and brought Japan close to recession. Thus Japan was in a weak state to be able to take the lead in Asia.

Hughes (2000: 220-221) is even more critical of the Japanese response to the Asian Crisis. First, Japan had vital geopolitical and economic interests plus aspirations as the regional leader. Second, Japan lost huge diplomatic capital and credibility with inconsistent support. For example, they had proposed a $100 billion Asian Monetary Fund (AMF), but the US and the European Union saw this as undermining both the IMF and an international consensus on dealing with the Asian Crisis. Against US and IMF opposition, they abandoned the AMF idea. To East Asian leaders this represented a **leadership void** on the part of the Japanese. Combined with the view that they were not defending their own developmental state model, they lost credibility as the regional leader.

Nervous about US political presence and more importantly increasing Chinese presence, they pledged $30 Billion to East Asian under the Miyazawa Initiative. But this was just a last ditch effort.

Besides the East Asian coutries of Thailand, Malaysia, Indonesia, and Korea, etc., the crisis spread to Latin America and Eastern Europe. Countries such as Russia, Ecuador, Brazil, Turkey and Argentina were affected. Of these The Russian Debt Crisis of 1998 had the most risk and it had very high geo-strategic importance.

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And this brings us to the **5th MPE Trigger** or more specifically the **1st Geo-Political Trigger** which falls under the Macro-Policy Environment category. In short, this **counter-trigger** works in reverse to **reduce 'uncertainty.'**

The Russian Debt Crisis of 1998 was particularly dangerous according to Wijnholds (2011: 70). At the time Russia was just transitioning to democracy thus the domestic political situation was very unstable plus it had nuclear weapons.

The US and particulary Germany were very concerned. The size of the Russian economy was small, comparable to Indonesia at the time. The fear was that a domestic economic collapse would lead to upheaval which would put **global security at risk**. It was treated very carefully when compared to Indonesia.

Wijnholds (2011: 71-73) states, *'To say that politics played an important role in the IMF's dealings with Russia is an understatement.'* Thus IMF influence in Russia was limited by the US and other members of the G7. The **policy was very favorable** and foregiving of Russia. IMF lending had begun in 1995 with $10 Billion USD. Reforms were slow or never done, but pressure for the IMF to continue to support Russia came from US President Clinton and German Chancellor Kohl.

The fallout from the Asian Crisis and a big drop in oil prices were the main factors behind the Russian default. Due to geopolitical concerns, $20 Billion was provided by the G7 directly. However, Russia still defaulted on August 17, 1998.

The Russian default sparked the **LTCM crisis** which was close towards sparking a **Super-Portfolio Tigger,** but was contained. The US preventing a serious problem by forcing a market solution on key players.

The LTCM crisis was caused by the creation of a 'super-portfolio' through mimic strategies (imitation). The same process occurred during the 2007 'Quant Crisis.' Both these crises were caused by Type I Psuedo-Arbitrage and Type II Market Actors pursuing psuedo-arbitrage strategies.

In summary, the fallout from the Asian Crisis led to The Russian Debt Default of 1998 and to the Long-Term Capital Management (LTCM) Crisis. The US and mainly Germany placed geo-politics above all else when dealing with Russia and the US quickly snubbed out a potentially large market disruption in the LTCM Crisis.

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Case Study 3

STDP Theory and a Geo-Political Resolution Crisis: Mexico 1994

Abstract

The STDP Theory of Financial Crises provides a unique perspective on our understanding and explanation of the Mexican Peso Crisis of 1994. A case study approach utilizing process tracing methods highlights how two of the three mechanisms (macro and disruption) of The STDP Theory can be applied towards uncovering the process of how this crisis unfolds.

Key Words: Financial Crisis, Crisis Theory, Process Tracing, Geo-Political

Brief Overview of the Study

The Mexican Peso Crisis of 1994 is an important example of crises that would fit under the Geo-Political Resolution Type Crises. This is similar to the Latin American Debt Crisis in which geopolitical considerations during the Cold War resulted in the US playing a major role in resolving this crisis. The Russian Debt Default of 1998 which was covered in Case 2 also falls under this crisis group. Other examples include the Turkish Crisis of 2001 and the Brazilian Crisis of 1998.

This was an important crisis in terms of potential contagion effects. This crisis also highlights a particular type of crisis (currency) to further test The STDP Theory of Financial Crises. In addition, the resolution of the crisis was very swift due to the geopolitical interests of the United States. This is an interesting case since the magnitude (crisis severity) could have been very severe due to the 'Tequila' effect, contagion, to other countries particularly in Latin America. Only a quick resolution led aggressively by the US prevented this crisis from getting out of hand.

However, we should be cautious here in attributing cause. Thus, a bit of historical context is needed, especially on the Mexican banking system. Calomiris and Huber (2014: 331-333) note that banking systems are subject to expropriation by strong authoritarian governments. They cite the case of Mexico where the party Partido Revolucionario Institucional (PRI) won every election from 1929 to 2000. Controlling congress, the PRI shaped the regulatory and legal environment in Mexico.

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This resulted in a small banking system in comparison to the size of the economy in Mexico. It was due to mostly distrust in the system.

According to Calomiris and Huber (2014: 364-366), the PRI shifted risk to taxpayers through development banks and since 1942 they required 60% of all private bank loans to fund such projects. Commercial loans made by private banks were repurchased by the development banks for dubious loans to commercial and industrial enterprises connected to and financed by the private banks. For example, *'In 1982, President Jose Lopez Portillo expropriated the banking system with the stroke of a pen.'* The banking system only existed for the next nine years to finance the federal government and politically crucial groups on *'criteria other than economic viability.'* This resulted in Mexico's *'so-called lost decade.'*

Under Salinas, the NAFTA agreement protected the Mexican bank oligopoly by limiting ownership for Canadian and US banks to less than 30% of a bank's capital, thus effectively excluding foreign banks. Calomiris and Huber (2014: 374-380) also state that reduced competition increased banks return on capital and combined with lax bank accounting standards specifically on the definition of non-performing loans (only interest was counted in areas) resulted in overinflated valuations. Lax regulation combined with inexperienced regulators lacking the right tools and technology and legal authority allowed Mexican banks to provide funding for political purposes. This was right before the Mexican Crisis of 1995.

Incidentally, the Turkish Crisis of 2001 was largely caused by Turkish banks being used as a slush fund for political purposes. Thus, Mexico is not an isolated case. What both these countries have in common is immense geo-political importance for the United States, thus IMF or US rescue packages would likely be quick with less oversight creating moral hazard problems.

The point here is that cause is attributed to the banking system in the case of Mexico above in studies with a micro viewpoint of crises. In fact, the cause here is political not the banking system. The banking crisis is just a symptom of political causes.

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Supporting Case Study and Process Tracing Tests

A brief overview of the process tracing tests is provided here for the convenience of the reader. For a more detailed discussion please refer to Chapter 3. Three of the four process tracings tests are in order of strength from Hoop (certain, but not unique), Smoking-Gun (unique but not certain) to Doubly Decisive (both unique and certain). The Straw in the Wind Test is just circumstantial evidence and thus neither unique or certain. Types of evidence, these are categorized as: Pattern (statistical), Sequence (temporal processes), Trace (exists or not) and Account (context of the evidence).

A rough visualization on how the **Mexican Peso Crisis of 1994** unfolds under the STDP Theory of Financial Crises is shown in Diagram 12 (page 187). This is meant as an aid to help the reader better understand the crisis using the 4-step process of the STDP Theory. The size of the factors is a very rough estimate by the author.

Mechanism Tests – Macro, Disruption and Micro (not covered)

The temporal processes the Japanese/Asian Financial Crisis Contagion Period can be explained by the STDP Theory of Financial Crises. The evidence presented passes the **Smoking-Gun Test** since this is a unique explanation but not certain.

Type of evidence provided is **Sequence** regarding the Macro Mechanism (Social, Trigger, Disruption and Psychological) and the macro to micro Disruption Mechanism. The STDP Theory provides a logically consistent explanation of how the Mexican Peso Crisis of 1994 unfolds through **two out of the three mechanisms**.

Trace evidence is present especially in the Trigger stage. As can be seen in Diagram 12 (page 187), Step 2: Trigger for this crisis period covers **two trigger mechanisms** in the STDP Theory. Having joined NAFTA, money started to flow into Mexico and it became a model for developing countries. Pressure was building on the Mexico Peso and this dramatically increased when the US raised rates and when political risk entered the picture when the two political assassinations happened. Thus, the most important trigger mechanism during the Mexican Crisis was the **Politics-Specific trigger** that results in **confidence** (or rather a loss of confidence). This came down to the ability of the Mexican government to keep the peg. Additionally, there was one major trigger event under the **Macro-Policy Environment (MPE)** and this resulted in **uncertainty**. It was a result of two political assassinations that also affected the

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Politics-Specific Trigger further undermining confidence. However, one MPE **counter-trigger event** due to **Geo-Political** reasons brought the situation quickly under control. The US stepped in and quickly putting together an aid package along with the IMF. This had the effect of reducing uncertainty.

In Step 3, the Macro to Micro Disruption Mechanism has all three processes affecting the market actors as shown in Diagram 12 (page 187). However, the biggest circle is **clustering**. The main affect was **'confidence'** with '**uncertainty'** for a short period of time. Thus, 'confidence' was behind the main disruption process with 'uncertainty' not great enough to cause the cascading effect. As stated in the previous paragraph, the 'uncertainty' due to the two political assassinations fed into decreasing the 'confidence' that market actors had of the politicians to keep the peg.

Thus, the disruption process was primarily herding using the **Schulmeister (2006: 220) and Hirshleifer and Teoh (2003: 27)** view of social herding. This is in line with the term **'rational'** herding. Therefore, we can incorporate this type of herding into the BDI Model in the same way as we had incorporated social herding – market actors following gurus, for example.

Thus, our study conforms with the view of **Calvo and Mendoza (2000) model of contagion and herding** in financial markets who use the example of the **1994 Mexican Crisis and the 'Tequila effect.'** Essentially, they point out that since information is costly, market actors do not consider country-specific rumors if it is too costly to obtain the information. They group each country the same and follow other investors who they think have more information.

In addition, **account evidence** is present since the **context of the evidence** provides a reasonably good explanation, especially regarding the politics. The STDP Theory captures **macro factors** – processes at the macro or sequence (step-level) and the macro to micro disruption process at a good level of depth. The micro level processes were not covered in this case study.

In addition, the information contained visually in Diagram 12 (page 187) helps us to roughly compare the severity and complexity of the Mexican Crisis with the Credit

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Crunch/Euro Crisis Period and the Japanese/Asian Financial Crisis Period. The **comparison is through the process** within the 4-step process theory STDP Theory of Financial Crises. It clearly shows that the Mexican Crisis was not as severe or complex as the other two crises.

Individual steps of the 4-step process theory measure up differently on the process tracing tests. Step 1: Social is very close to passing the **Doubly Decisive Test** since the actor breakdown during this crisis period is much closer to reality than most competing explanations. This is certainly unique and very close to being certain, thus this part of the model is certainly at the Smoking Gun Test level but closer to the Doubly Decisive Test level. On the other hand, Step 4: Psychology just passes the **Hoop Test** since this part is not unique. In between sit Step 2: Trigger and Step 3: Disruption, both these steps provide a unique explanation, but not certain as other explanations are available, thus they can be considered at the **Smoking-Gun Test** level. Finally, the Micro-Level Mechanism was not tested in detail thus we cannot make the claim that it passes the Smoking-Gun Test level.

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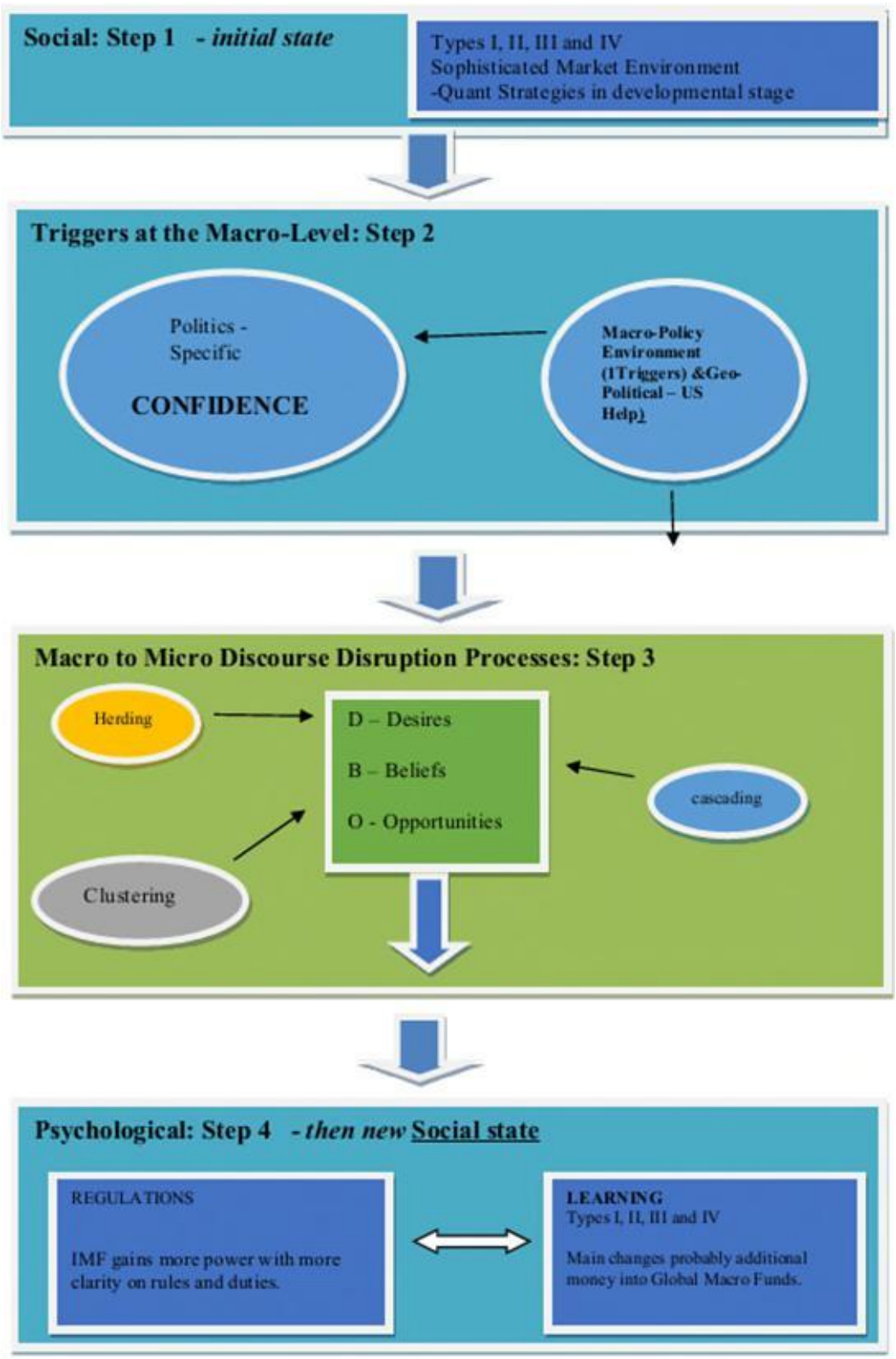
Diagram 12: STDP Theory and the Mexican Peso Crisis of 1994



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Step 1: Social

The market actors prior to the start of the crisis would resemble the ones shown in Table 20 below that would constitute the market structure during the modern period of finance. The key actors fall under **Type II: Market Makers** – Banks (Mexican) and Proprietary Trading Desks at Banks/Investment Banks (FX trading) plus **Type III: Small Alpha** – Emerging Market Mutual Funds. Note that emerging market hedge funds were not as popular then and the dominant hedge fund strategy at the time was Global Macro accounting for 39.3% of hedge fund AUM in 1990 (AIMA's Roadmap to Hedge Funds 2008). Finally, high-frequency quantitative funds were just being developed and did not play a role in this crisis.

This crisis occurred about 2 years prior to the Asian Crisis of 1997, thus the market structure and actors are the same. Some hedge fund strategies such as fixed-income arbitrage just starting to increase in sophistication and popularity. For example, Long-Term Capital Management (LTCM) was founded in February 1994. Thus, bond funds/traders would have played a bigger role than bond hedge funds.

Table 20: Market Actors adapted to the Mexican Peso Crisis of 1994

	Main Actors	**Sub-Actors**
Type I **Pseudo - Arbitrage**	**Bond Funds/Traders** *Tesobonos, etc.*	**Mutual Funds and Insurance Mutual Funds**
Type II **Market-Makers**	**Banks – Mexican & Foreign** **Proprietary Trading Desks – Banks and Investment Banks** *Currency Speculation*	
Type III **Small Alpha**	**Emerging Market Mutual Funds**	
Type IV **Large Alpha**	**Opportunistic** **Global Macro** *Currency Speculation*	**Opportunistic** **Emerging Market Hedge Funds**

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Brief Overview of Regulatory Environment and IMF

The same as in the Japanese & Asian Crisis Contagion Period (Case Study 2). Thus the 'Washington consensus' and 'orderly liberalization' were the predominate themes. Essentially the free movement of capital was seen as important to economic development. The key here was that international capital flows were positive if managed properly.

As mentioned early under Case Study 2, Moscella (2012: 91-92) emphasized that the Mexican crisis was a critical test for these ideas. Therefore, a failure in Mexico would probably put these ideas to rest. Mexico was the model at the time for the developing countries. For the IMF, the Mexican Crisis brought some changes at the institutional level that strengthened its power and oversight of the global financial system.

Step 2: Tigger

Moschella (2012: 65) states that Mexico in the early 1990s had undergone a significant transformation based on liberalization of trade and the finance sector. Inflation had fallen to its lowest level in 21 years, real GDP growth was 2.5% (1989-1994) and the public sector debt significantly reduced. And in 1994, Mexico became a member of NAFTA (North American Free Trade Agreement).

This brought hope among investors. Moschella (2012: 65-66) further adds, that between 1990 to 1993, capital inflows into Mexico were 40% of total inflows to Latin America. The transformation process put in place by the Secretary of Finance, MIT-trained Pedro Aspe Armella had worked spectacularly. Mexico now became a role model.

Hsu (2013: 75-76) discusses that this success in Mexico was a result of **'*El Pacto*,' an agreement between labor organizations, industry and the government**. The goal was to liberalize trade and investment in order to increase competitiveness. Mexico not only joined NAFTA but also the OECD (Organization for Economic Cooperation and Development) and APEC (Asian-Pacific Economic Cooperation). Capital poured into Mexico with flows between 1991 to 1993 around **15 times the total** from the previous decade. This hope was also shared by politicians as Moschella (2012: 66)

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states that Lloyd Bentsen, the US Treasury Secretary, praised *'Mexico's policies as an example for all of Latin America.'*

But not all was well. According to Wijnholds (2011: 11-12) some warnings were raised early. In late 1993, Rüdidger Dornbush, the highly respected economist, noted that imports were growing faster than exports (mostly oil) and the external deficit currently at 5% was progressing towards the 7% mark.

Confidence is important in defending a currency peg. The Mexican Peso was pegged to the US Dollar and this had helped bring down inflation. To maintain the peg, policies need to be inline along with a little bit of luck. However, political events dictated the pace and luck had run out when the **US started to raise interest rates**. Moschella (2012: 67) notes that interest rates rose 0.25% in February 1994. This is after remained constant at 3% since 1992. By November 1994, US interest rates went up five times and stood at 5.5%.

In early 1994, **the assasinations of two politicians** from the Partido Revolutionario Institucional (PRI) threw the country into a state of confusion. Luis Donaldo Colosia was the presidential candidate and Jose Francisco Ruiz Massieu, the next congressional leader of the PRI. This can be considered the **1st MPE Trigger** since it increased political instability.

It should be noted that the PRI had ruled Mexico for around 50 years. And it was only in 1997 that opposition parties gained some power in the legislature and in 2000 in the presidential elections. In short, the PRI should be seen as having a strong grip on politics during this time period and slowly started loosing its grip after the Mexican Peso Crisis of 1994.

Hsu (2013: 76) notes that on top of the two political assassinations, Mexico had been dealing with an uprising in the state of Chaipas. Several cities were siezed by the Zapatista movement who had declared war on the Salinas administration. She states,*'While the Salinas administration was credible in its commitment to defend the peso, instability set in when the political arena degerated.'*

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Moschella (2012: 67-68) states that the **first speculative attack** was on the 23rd of March 1994. The Mexican Peso lost about 10% and interest rates went to 7%. The government instead of raising rates to stop the attack on the currency, tried something unorthodox. A new short-term dollar denominated instrument called Tesobonos was introduced. To maintain the peg, **short-term (Cetes)** and **long-term peso denominated bonds could be exchanged for Tesobonos**.

In short, **domestic politics** dictated this policy since the presidential elections were to be held in August. Thus, a **spike in interest rates before elections was not possible**. Moschella (2012: 68) notes that this transformation of government debt into an instrument denominated in US Dollars was seen as positive by financial markets since they saw a higher likelihood of Mexico paying the foreign debt.

Thus as **Tesebonos grew, reaching $50 Billion** at one point according to Wijnholds (2011: 13), foreign exchange reserves fell from $30 Billion US Dollars to $18 Billion US Dollars in May. And only $8 Billion of that could be used to keep the peg. He states, *'In addition, the Mexican banking system was inefficient, poorly supervised, and, as it turned out later, barely solvent.'*

Moschella (2012: 68) states that confidence increased after the election of the PRI candidate Ernesto Zedillo in the August presidential election and things got better until October. Then, a **domestic political shock fueled a *second speculative attack*** on the Mexiacan Peso. This occurred when Deputy General Mario Ruiz Massieu resigned. This was damaging since the head of the legal institution of Mexico was protesting the attempts by the government of Mexico in blocking the investigation into the assassination of his brother – Ruiz Massieu.

Things spiralled to the downside from this point and on the 20th of December 1994, the exhange-rate band was widened to 15%. Wijnholds (2011: 13) states that, *'Two days later the government threw in the towel and the peso was decoupled from the dollar, eventually floating down by 70 percent.'*

The banking sector already under pressure due to tightening monetary policy and non-performing loans, were now dealing with risky loans denominated in foreign currency

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becoming riskier. Around 30% of total loans were foreign currency based accornding to Moschella (2012: 69). In addition, interest rates reached 80% in the first quarter of 1995. Needless to say, this doubled the cost of servicing those loans by corporations and indivduals.

A geopolitical rescue from the United States came swiftly and with a large of amount of funding. The IMF and US congress were pushed into supporting Mexico by the Clinton administration. The geopolitically motivated rescue by the US under The STDP Theory of Financial Crises can be termed the **1st Geopolitical Trigger** under the **Macro-Policy Environment Trigger**. Essentially this trigger works in reverse to the normal Macro-Policy Environment Trigger by **reducing 'uncertainty.'**

Wijnholds (2011: 14-15) notes that the Mexican bailout was intiated by the US Treasury Secretary Robert Rubin, economist Larry Summers and Federal Reserve Chairman Alan Greenspan. President Clinton swiftly agreed to the proposal. However, selling this package to Congress and the US public was tough. In the end, the US Treasury Secretary Rubin and Summers went around congress by tapping into the Exchange Stabilization Fund (ESF). This was essentially a slush fund held at the IMF to stabilize the dollar FX rate. The US offered a loan of $20 Billion from the ESF and the IMF quickly agreed to the $18 Billion (the most the Europeans would consider).

The **Europeans were skeptical since they considered this mostly an American problem** and did not see why they should support the Mexican economy which at that time was about the size of the Netherlands. In short, **they did not buy the 'Tequila'** effect or contagion being as serious as the 1982 Mexican crisis. It was in their view a Western hemisphere problem. Wijnholds (2011: 15-16) states that **Europeans were upset** because they were not consulted before the rescue package to Mexico. They found the actions of both the US and the IMF as hasty. He states that *'Most IMF Board meetings on credit approvals are ineventful, as the outcome is almost always informally decided before such gatherings...the meeting on Mexico's jumbo credit turned out to be lively. ...most European board members expressed their objections...the lack of support from six European executive directors was widely reported in the media.'* Moschella (2012: 72) states that US Secretary Rober Rubin recalled how upset and furious G7 allies were at both the IMF and the US.

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In the end, Mochella (2012: 70) notes that this was the largest single aid package by the IMF to a member country. A loan of $17.8 Billion USD was approved on the 1st of February 1995. The US chipped in an addition $20 USD, with the Bank of International Settlements (BIS) providing $10 Billion USD. Commercial banks gave an additional $3 Billion USD.

In total, **Mexico received around $50 Billion USD**. In the end, Wijnholds (2011: 18) says the Mexican rescue succeeded. More importantly, it did not turn into a 'Tequila crisis' and Latin American countries did not experience significant contagion. Hsu (2013: 79) states only Argentina was impacted severely and barely touched Brazil. Regarding Argentina it was resolved relatively quickly since Argentina was in better shape at the time than Mexico.

This shows that the stakes were very high politically and economically for the US for the reasons listed in Table 21 on page 194. Domestic politics regarding NAFTA were also a potential risk. Hsu (2013: 78) states that the crisis in Mexico put the NAFTA agreement at risk since a major precondition of NAFTA was financial market liberalization. In congress, US representatives that had initially opposed NAFTA started to contemplate for the US to leave.

Note that for the US even domestic political and economic reasons have a geopolitical implication indirectly. As a superpower, any weakness on the domestic side, either political or economic, will have an impact on US power globally in terms of military, economic and political strength real or perceived.

In short, geopolitical concerns provided a quick resolution to the Mexican Peso Crisis of 1994. What is key to note here is that the **Geo-Political trigger** under the 4-Step Process Model of Financial Crises **mitigated contagion fears and 'uncertainty**. The politics-specific trigger is common in all currency crises, thus 'confidence' is the main market overhang. 'Uncertainty' was present up until the US stepped in to resolve this crisis in a quick and forceful way.

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The reasons behind the US push to quickly resolve the Mexican Peso Crisis of 1994 are summarized in Table 21 below.

Table 21: Reasons behind Strong US Support for Mexico during Crisis in 1994-1995 **Adapted from:** Moshchella (2012: 70-72), Hsu (2013) and Wijnholds (2011)	
NAFTA and Political Reputation Clinton personally had high political and reputational stakes in Mexico. Bush intiatially negotiated NAFTA agreement but Clinton signed it. This was the first major battle for Clinton in congress to obtain support.	Political – US Domestic Political - NAFTA Economic – NAFTA
Demand for US Exports and US Job Losses US Treasury Secretary Robert Rubin – American interests, Mexico was 3rd largest trading partner of US. Mexico Peso collapse – inflationary and recessionary pressure.	Economic – demand for US goods lower Political – US workers loosing jobs
Contagion – Latin America US FED – contagion to Latin America would reduce US GDP by 1/2 to 1 percent.	Economic – lower US Growth
Immigration White House and State Department – likely to cause massive waves of illegal immigration heading for the US	Political - Domestic
Political and Economic Instability National Security Advisor Anthony Lake – US exports and illegal immigration arising from Mexican political instability and economic problems.	Political – Domestic Economic - Domestic
Free Trade and Financial Market Liberation It would have been a blow to free trade and financial market liberation if Mexico failed. Important part of Clinton's foreign policy agenda to open markets – goods and financial.	**Geopolitics** – Part of US Foreign Policy Agenda
Role Model Failure of a country that was sold as role model for developing countries woul have been seen as blow to free trade. Larry Summers stated that this would send a bad message to developing countries such as: Russia, China, Poland, Brazil and South Africa.	**Geopolitics** – Perceptions of free trade in developing world

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Chapter 7: Conclusions

Concluding Remarks: The STDP Theory of Financial Crises

The process-oriented financial crisis theory was the most important accomplishment of this study. It was the result on focusing on one key question – **Why do financial crises happen?**

Embedded within this question is the search for understanding and explanation of financial crises. The goal of prediction was eliminated right from the start after having seen that large-N studies had essentially failed to predict financial crises. However, the literature on quantitative studies is important since it provides the groundwork needed to study crises with a fundamentally different approach. The main limitations of quantitative studies result from simplification in order to increase comparability to achieve the elusive goal of predictability. What is left out is context - social, political and institutional.

In short, the STDP Theory did succeed in providing a **broader explanation** on why financial crises happen. The social, political and institutional aspects were incorporated in the explanation of several case studies. Next, we will review the **main contributions** of this study to the literature on financial crises, theory-building and limitations.

The literature on financial crises provides a narrow explanation. This was articulated in Chapter 2 and from the explanations offered in several papers in Chapter 6, specifically the introduction of each of the crisis case studies. These studies focused on either a macro or micro explanation of financial crises. In addition, the connection between the macro to the micro was mostly left out of the explanation.

In contrast, the STDP Theory of Financial Crises incorporates **three mechanisms**: macro-level, micro-level and macro to micro disruption. These mechanisms are represented in Diagram 13 on the next page.

Thus, **designing the crisis explanation framework** with three mechanisms would provide a broader explanation than a crisis explanation framework employing one or two mechanisms. It is important to note that this does not imply a better or more useful crisis explanation framework.

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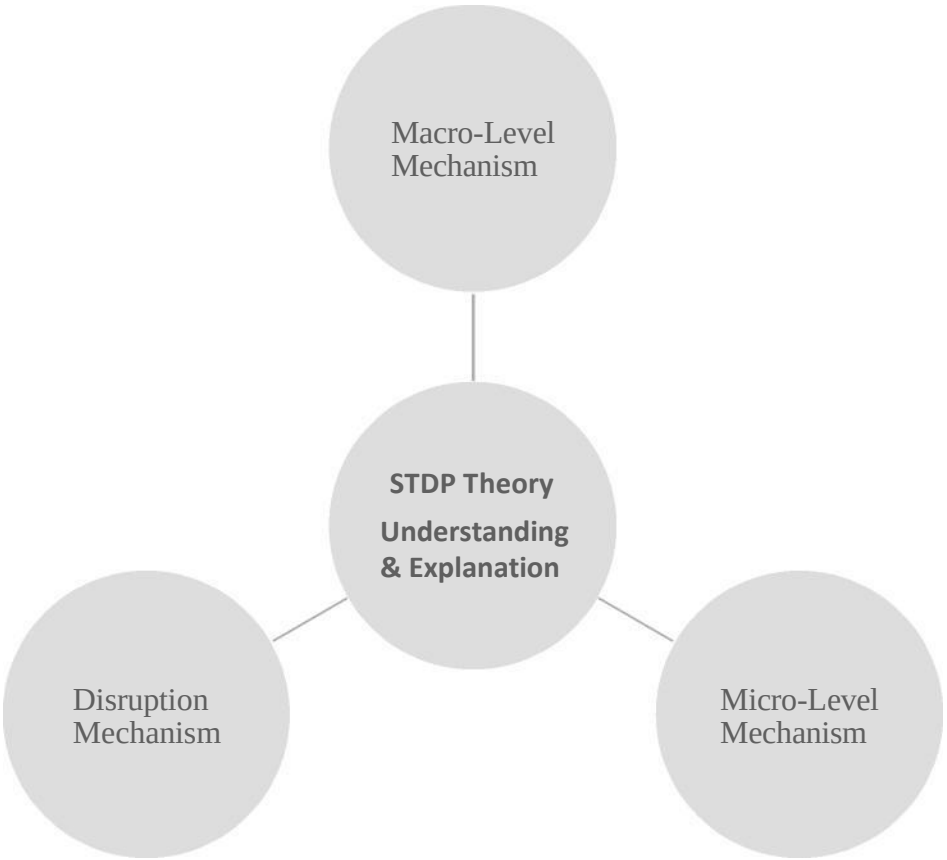
The issue of a better explanation depends on the purpose and needs of the user. For example, if new regulations on banks are needed after a crisis, then a micro-level explanation might be more useful than a broader explanation for regulators.

Diagram 13: The STDP Theory of Financial Crises and Key Mechanisms



The applicability of The STDP Theory of Financial Crisis was shown to be wide enough to apply to crises from different historical periods as well as crises of different types. In this respect, a three-mechanism design resulting in a broader explanatory crisis framework would be an advantage over narrower explanations.

However, it should be noted The STDP Theory was developed for understanding crises in the modern era - that is since the rise of derivatives and hedge fund strategies in the 1970s and 1980s. This could be a **limitation** of the theory. The question then becomes can we apply the theory to different historical time periods with different

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market actors and institutional frameworks. The theory seems flexible enough to accommodate these differences, but **further testing of additional case studies** would need to be undertaken. For example, a **preliminary attempt** has been made on one case study covering the Dot.com Bubble. Initial results have been promising. An example of potential market actors prior to the start of the Dot.com Bubble of 2001 are shown in Table: 22 below. Note: this is for illustrative purposes only.

Table 22: Market Actors during the Dot.com Bubble of 2001 (for illustration)

	Main Actors	**Sub-Actors**
Type I **Pseudo - Arbitrage**	Mutual Funds (Passive)	
Type II **Market-Makers**	**Investment Banks** – IPOs	Market Makers on NASDAQ
Type III **Small Alpha**	**Retail: Individual Investors** **Sector-Focused Mutual Funds (Active) and Long Short Equity Hedge Funds** (IT and internet related)	
Type IV **Large Alpha**	Opportunistic: **Macro Hedge Funds** **Venture Capital**	

In this crisis, the actors were mainly venture capital funds awash with investor money bringing new technology ventures to market as initial public offerings (IPOs) that were facilitated by investment banks. The euphoria of the internet investments was fuelled by retail (individual investors) and large hedge funds. Macro hedge funds lost quite a bit of money during the Dot.com Bubble. For example, the hedge fund run by Soros reportedly lost billions. The point here it is possible to explain the **Dot.com Bubble** under The STDP Theory of Financial Crises (see also **pages 129-131**).

However, the psychological-focused explanation offered by Kindleberger and Aliber (2005) also explain the Dot.com Bubble very well. Thus, while the STDP theory is flexible enough to explain a wider variety of crises it does not necessarily follow that

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it is the **best explanation for a specific crisis**. Table 23 below further shows the flexibility of the STDP Theory to provide possible explanations of selected crises.

Table 23: Potential Crisis Trigger and Market Actors – selected crises			
Crisis	**Risk Framework Type**	**Main Market Actors**	**Trigger Mechanism**
Flash Crash – May 2010	Type II	Market Makers - Knight Capital & BAT	Model - Specific
2001 Dot Com Bubble	Type I and Type III	Venture Capital-Investment Banks Retail Investors and Macro Funds Active Mutual Funds (Hi-Tech Funds)	Social - Specific
1987 Black Monday	Type II, then almost simultaneously to Type I, Type III and Type IV	All – derivatives hedging replication strategies failed	Model - Specific

The reason why the STDP Theory of Financial Crises may not be the best explanation for a specific crisis has to do with the concept of **equifinality**. It should be stressed that in all open systems such as economic systems, equifinity is always present. Equifinity also implies that some of the intervening process could vary and produce the same results. For a more complete discussion, please see Goertz (2017), Beach and Pederson (2016), and Gerring (2012).

For example, any explanations of the 2007-08 crisis would be subject to the concept of **'equifinality'** or the idea that **multiple explanations or paths** could reach the same outcome. This is appropriate for such a major crisis due to the complexity arising from the interaction of numerous factors. Kolb (2011) points out that **no single cause** was responsible for a financial crisis that was of a similar kind to the Great Depression.

Thus, while The STDP Theory of Financial Crises is better adapted to explaining a wider variety of financial crises thanks to a more comprehensive approach, see Diagram 3 on next page (from page 104). It is not the only explanation possible since **each step** in the 4-step Macro-Level Mechanism is **subject to equifinality** as well as the whole of the STDP Theory.

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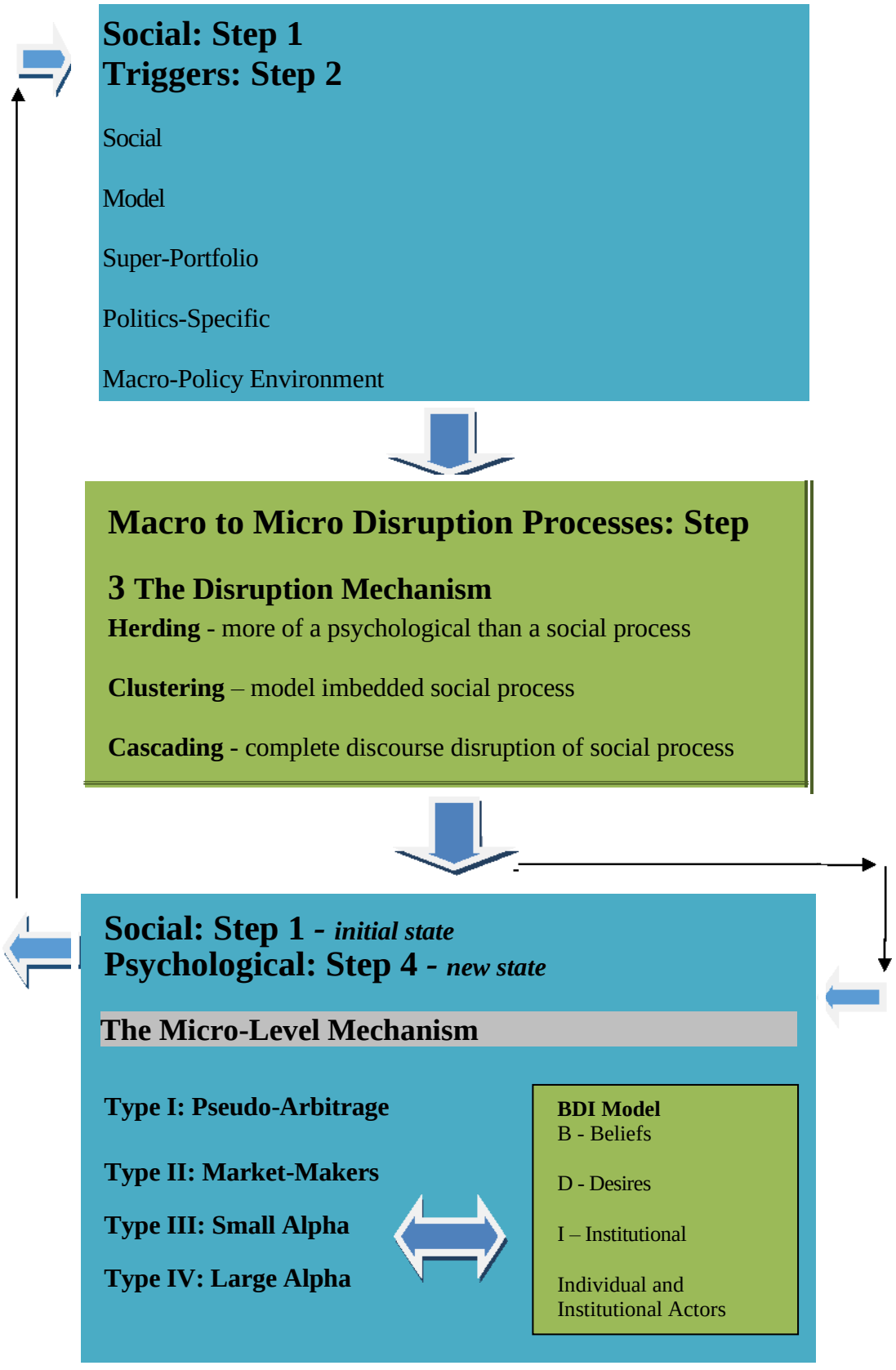
Diagram 3: The 4-Step Macro-Level Mechanism of the STDP Theory



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In addition, it might not be the best explanation for regulators. As stated earlier, a more useful or better explanation could be a more focused study on micro factors such as the models used in pricing subprime loans or the problems of asymmetric information in home loans.

This discussion then brings us back to **main contributions of the STDP Theory of Financial Crises**. In short, there are **six main contributions**. Five are related to the STDP Theory and one contribution is related to research methodology.

- **Broad and Comprehensive Crisis Explanation Framework**

The design of the STDP Theory employs a broad macro mechanism that incorporates a wide variety of triggers and a micro mechanism and is neutral on rationality. Although three cases were covered in this study, it is evident that the design of the STDP Theory can potentially explain crises arising in different historical periods or that are based on a broad variety of triggers. At this point, we can only make the claim that it can explain financial crises from the **modern era of finance** that began with the wider use of derivatives and the rise of hedge funds.

As discussed, further case studies would need to be conducted to conclusively show the applicability of the STDP Theory of Financial Crises. An important future case study to consider would be the **Great Depression** since the market actors and institutional framework during this crisis are different than the modern era of finance.

Finally, we should always keep in mind that this might not result in a better or more useful explanation for specific crises. Thus, we can see there is a trade-off between a more comprehensive framework versus a narrower explanation for a specific crisis.

- **Incorporation of Historical Context – Social, Political and Institutional**

In contrast to quantitative studies, STDP Theory emphases socio-political processes in financial crises. For example, this can easily be seen in the 1997 Asian Crisis where the explanation offered by the STDP Theory is consistent with longer-term geo-political explanations of the crisis that account for the influence of the Japanese model long before the Thai Bhat collapse in 1997. This longer-term perspective contrasts with main stream explanations of the crisis. Similarly, the Mexican Peso Crisis of

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1995 is seen as having had a very strong political component versus the mainstream view. Thus, a longer-term perspective in this case emphasizes political aspects.

In short, the STDP Theory of Financial Crises places an **emphasizes socio-political factors** compared to the quantitative approaches. This sharp contrast to the quantitative approach as represented by the meta study on political factors by Rother (2009: 132-133). He concludes that the **inclusion of political factors in models yields poor to marginal results**. He states, *'Regarding overall model performance, various statistical test procedures revealed that adding political variables slightly increases the efficiency of the models, as the higher explanatory power is not fully offset by additional complexity.'* The difference in based on the inclusion or non-inclusion of historical context, respectively.

- **Comparability of Crises - through the process of how crises unfold**

Different historical periods present problems in comparing crises. This was discussed in Chapter 1 for example. However, The STDP Theory provides a way around this problem by **allowing us to compare how crises unfold**. A preliminary four-level Crisis Magnitude Framework was proposed along with a definition of crises under each magnitude level. As more crisis case studies are conducted in the future, this framework can be refined and improved.

The usefulness, of comparing the processes in the three crisis case studies can be seen when looking at the 2007-08 Credit Crunch/Euro Crisis Period versus the 1997 Asian/Japanese Crisis Period. The comparison of how these crises unfolded clearly showed the different severity levels of the two crises, with uncertainty and confidence concerns varying in the two crises respectively.

In addition, the 1997 Asian/Japanese Crisis Period did not escalate further thanks to quick action by the US in the case of LTCM and geo-political concerns in the case of Russia contained the crisis to a major regional one. In contrast, US government policy during 2008 led to the MPE trigger that resulted in letting Lehman Brothers (investment bank) collapse. This policy action escalated the crisis. Thus, looking at

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the **process of how these two crises unfold** tells us a lot regarding the final severity of each crisis.

- **Improved Understanding and Explanation of Financial Crises**

Different crisis explanations focus on either macro or micro factors and these can be very useful in explaining specific aspects of a crisis. Interested parties such as regulators, central bankers and investors would benefit by combining both types of crisis explanation frameworks. For example, they could use a narrower quantitative or non-quantitative explanation based on micro or macro factors and then **combine** this with a **broader view provided by the STDP Theory** to **gain a more complete picture** of a crisis. This could help to put things into a longer-term or historical perspective and possibly add value to policy makers.

In short, combining explanations might be the best solution. This also relates to the issue of equifinity since results can be explained by different paths. Therefore, even if an alternative explanation is offered, value would be added by the STDP Theory through in-depth explanations of three mechanisms – macro, disruption and micro.

- **Realistic Micro-Mechanism for Financial Markets**

The Micro-Mechanism was a result of the need to revisit the rationality assumption of agents and the abductive process that led to literature on heterogenous agents and 'multiple equilibria' under the assumption that there is not an undisputed fundamental equilibrium model.

The modifications made to a risk framework from Fenton- O'Creevey et al (2005) and to DBO Theory by Hedström (2005) allowed for an 'acceptable' model. The Micro-Mechanism now consisted of a **Trader Risk Framework** and the **BDI Model** and this combination accounted for the institutionalized environment of finance and macro-level factors while mitigating the 'reductionist' nature of the analytical sociology model. The result was a **more realistic model** for financial markets.

- **Refinement of a Theory-Building Methodology**

The refinement and articulation of a theory-development methodology designed for the social sciences was a key contribution of the development of The STDP Theory

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of Financial Crises. In short, this study would not have been possible without the right research approach which was discussed in Chapter 3: Research and Methodology. In the social sciences, the Abductive research strategy is designed for gaining an understanding of the actors. In addition to understanding, a research methodology focused on explanation are key requirements for theory development.

The Abductive and Retroductive research strategies are ideally suited to theory development. Most importantly these two research strategies allowed one the freedom to think creatively. However, both research strategies were vague and needed additional refinement for better integration and for practical implementation.

Under the Retroductive Research Strategy (RS), the **method of process-tracing** was employed to fill in this gap. Process-tracing has been used for finding and testing causal mechanisms in political science, organizational studies, international relations, microbiology, and decision research for example. In summary, process-tracing provided a **practical way to operationalize theory development and testing** under the Retroductive Research Strategy (RS). Practical theory development relied on thought experiments and the use of counterfactual thinking that took place over several years. This was especially the case regarding the development of the Macro Mechanism and the connection with the Disruption Mechanism.

As for the Abductive RS, the main contributions to theory development were provided by **'insights' or 'clues'** that were then used under the Retroductive RS to create theory. This required a shift of emphasis away from the initial 'lay' accounts from the quasi-experimental study towards the more important 'scientific' accounts. In short, the purpose of the 'lay' accounts was to point to specific literature. The literature related to the Abductive RS was placed in Chapter 2: Literature Review. To provide context, an overview of key business cycle and non-cycle theories were highlighted along with some of the main issues and assumptions relevant for a crisis explanation framework. Thus, the groundwork was laid for the most important step in the abductive process.

In Chapter 4, the focus became the **critical 'insights' or 'clues'** that arose from the **abductive process** highlighted in Diagram 2 (shown on the next page). In short, there were four potential 'insights' or 'clues.' It should be noted that the 'clues' varied in

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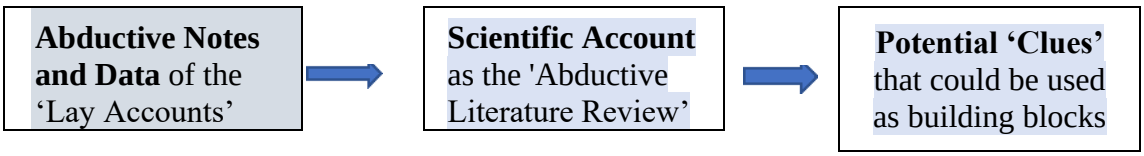
strength but in the end they all contributed to the development of the crisis theory, as highlighted in Chapter 5: The STDP Theory of Financial Crises.

A major difficulty arose due to the nature of the Abductive RS. The references to literature are part of the iterative nature of the theory-building methodologies that required an extensive use of combining evidence with references to scientific literature. **The problem was how to present all this information** in way that would **not hinder coherence and clarity** of the final thesis.

The solution was to see that what is critical for theory development is not the full details of the abductive study and process but the actual outcome or path that led to **insights or 'clues'** that could eventually be useful in the final development of theory of financial crises. The abductive study by its very nature is very large thus providing the full details of study would disrupt the coherence and flow of the argument. Our goal was not to minimize the importance of the abductive study but to **prioritize coherence and the theory building**. The logic of abduction is similar to how a detective might proceed in solving a murder mystery. Using this analogy, the abductive process can be visualized as follows (Diagram: 2 from page 63):

Diagram 2: The Three-Step Abductive Process



Thinking of the abductive process in this way, allowed us to place the large amount of data and analysis of that data (now termed Abductive Notes) on the CD disk and on Google for easy access. In addition, the 'scientific account' that represents critical literature review was no longer after the methodology section but integrated with literature review. This structure allowed us to focus on the 'insights' and 'clues' and their contribution to theory development.

This approach is in-line with the thoughts of Meyer and Lunnay (2013) who stress that the use of retroduction requires the need to go beyond the empirical data. Since it is **not as logical of an approach like deductive, the empirical data need not be as**

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rigorous. To employ the Retroductive RS, a researcher needs to **utilize 'assumptions' to explain**. In short, it is an instinctive mode of inference.

Additional Limitations and Researcher Biases

The quasi-experimental studies and surveys were conducted during 2010 to 2012. This was the period immediately following the 2007-2008 Credit Crunch, thus attitudes towards the EMH as well as psychological and sociological aspects of the market could have been heavily biased due to the severity of the Credit Crunch and the Euro crisis.

Interpretation of data obtained through the case studies of the trading class is based on **subjective judgement** and thus biases. It is quite possible that someone else could obtain different results due to differences in subjective interpretation and predisposed biases. These effects were somewhat minimized through data triangulation (report, marking sheet and video presentations).

In my case, I have a sceptical attitude towards the EMH due to years of trading experience. Thus, this bias could have affected how I interpreted the data of the trading case studies using content and thematic analysis. My view on the EMH is that is exists possibly in the Weak EMH form or less. This bias would, of course, lead me to interpret the data differently than most academics in finance.

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